



LOEWE.



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Hinweis zum Schutz gegen Elektrostatik

1. Elektrostatisch gesicherte MOS-Arbeitsplätze.

Der Umgang mit gegen Elektrostatik empfindlichen Bauteilen muß an einem elektrostatisch gesicherten MOS-Arbeitsplatz erfolgen.

Ein elektrostatisch gesicherter MOS-Arbeitsplatz erdet über Entladungswiderstände sämtliche leitende Materialien einschließlich der Person. Nichtleiter werden durch Luftionisation entladen. Die Integration von Lötkolben und Meßgeräten in den gesicherten MOS-Arbeitsplatz ist nur mit Trenntrafo in jedem der verwendeten Geräte möglich. Die Meßgeräte-Massen werden ebenfalls mit Entladungswiderständen geerdet.

2. Gesicherte Verpackung durch leitfähige Materialien.

Zum Schutz gegen Elektrostatik werden elektrisch leitende Kunststoffe für Verpackung und Transportmittel verwendet. Leitende Kunststoffe gibt es als schwarze oder transparente Schutzbeutel, Schaumstoff, Folien und als Behälter. Empfindliche Bauteile dürfen nur am gesicherten MOS-Arbeitsplatz aus der Verpackung entfernt bzw. verpackt werden.

Sicherheitshinweise/Vorschriften

1. Instandsetzungen, Änderungen und Prüfung netzbetriebener elektronischer Geräte und deren Zubehör dürfen nur von fachkundigen Personen ausgeführt werden.
2. Es gelten die Vorschriften und Sicherheitshinweise nach VDE 0701, Teil 200, und die Vorschriften und Sicherheitshinweise des jeweiligen Landes!
3. VDE 0701, Teil 200, beinhaltet Vorschriften zur Instandsetzung, Änderung und Prüfung netzbetriebener elektronischer Geräte und deren Zubehör.
4. Vor der Auslieferung des Geräts muß eine Sichtprüfung des Geräts und der Anschlußleitungen (und soweit vorhanden, des Schutzleiters), und die Messung des Isolationswiderstandes und des Ersatz-Ableitstromes nach VDE 0701, Teil 200, durchgeführt werden. Der niederohmige Durchgang des Schutzleiters ist durch Messung laut Vorschrift VDE 0701, Teil 1, nachzuweisen.
5. Die Vorschriften des jeweiligen Landes sind zusätzlich zu beachten.
6. Bauteile mit dem Symbol  gekennzeichnet, dürfen nur durch Originalteile ersetzt werden.

Demontage der Rückwand

Zum Abnehmen der Rückwand werden die fünf Rückwandschrauben **R** herausgedreht. Schraubenzieher in die Aussparung **V** einführen. Verriegelung nach unten drücken und gleichzeitig Rückwand nach hinten schieben (Abb. 1).

Gerätechassis in Reparaturstellung bringen

1. Das Chassis hinten leicht anheben und vorsichtig nach hinten aus dem Gerät herausziehen (Abb. 2).
2. Lösen Sie die Kabelfixierungen. Drehen Sie jetzt das Chassis um 90° entgegen dem Uhrzeiger und stellen Sie das Chassis hinter dem Gerät ab (Abb. 3).
3. Nach erfolgter Reparatur/Einstellung müssen die Leitungen wieder in ihre ursprüngliche Lage gebracht und fixiert werden.

Reparaturstellung für die Leiterplatte Signal-Board

1. Die Leiterplatte Signal-Board vom Hauptchassis (Basic-Board) abnehmen; vorher müssen alle Anschlußkabel abgezogen werden.
2. Die vier Schrauben (A) (Abb. 4) aus der AV-Abdeckung aus Kunststoff herausschrauben und die AV-Abdeckung durch Ausclipsen von der Leiterplatte Signal-Board abnehmen.
3. Die vordere Metallabdeckung von der Leiterplatte Signal-Board abnehmen (Abb. 5). Den gleichen Vorgang bei der hinteren Metallabdeckung wiederholen (Abb. 6).
4. Die drei Verlängerungskabel an die Leiterplatte Signal-Board anschließen; darauf achten, daß die Leiterplatte Signal-Board die Leiterplatte Basic-Board nicht berührt (Abb. 7).
5. Nach erfolgter Reparatur/Einstellung müssen sämtliche Kabel wieder in ihre ursprüngliche Lage gebracht und fixiert werden.

Hinweis:

Die Verlängerungskabel werden als Reparatur-Teilesatz unter der Bestell-Nr. 291-90274.920 geliefert.



Reparaturhinweis Signal - Board MediaPlus

Bei Fehlern auf dem Signal-Board gehen Sie bitte folgendermaßen vor:

- Nehmen Sie den EARAM (I 1891) aus der Leiterplatte heraus. Das Gerät ist weiterhin spielfähig.
- Bekommen Sie jetzt ein stehendes Bild, ist der EARAM defekt, (etwaige Geometriefehler bleiben dabei unberücksichtigt).
- Ist der Fehler weiterhin vorhanden, liegt das an einem anderen Bauteil auf dem Signal-Board.
- wenn Sie das Signal-Board bei der Kundendienst-Zentrale Kronach tauschen wollen, setzen Sie den EARAM aus dem defekten Signal-Board in das neue ein. So ersparen sie sich den Geräteabgleich und die Programmierung.

Wichtig!

Am defekten Signal-Board entfernen Sie bitte die AV-Abdeckung.



Note on electrostatic shielding

1. Electrostatically shielded MOS workstations

Components sensitive to electrostatic discharge must be handled at workstation with electrostatic shielding. An electrostatically shielded MOS workstation is fitted with discharge resistor which earth all conductive materials, including the technician working there. Dielectrics are discharged by air ionisation. The use of soldering irons and measuring equipment at shielded workstation is only possible in conjunction with isolating transformer in each of the devices used. Measuring equipment chassis are also earthed with discharge resistors.

2. Shielded packaging using conductive materials

To protect against electrostatic charges, electrically conductive plastics are used for packaging and transport purposes. Conductive plastics are available in the form of transparent protective bags, foam plastic, film sheeting or containers. Sensitive components requiring the use of protective packaging must only be packed and unpacked at shielded workstations.

Safety warnings/regulations

1. The repair, modification and testing of mains-operated electronic devices and their accessories must only be performed by qualified persons.
2. It is necessary to follow the regulations and safety warnings to VDE 0701, part 200, as well as the regulations and safety warnings applicable in the country concerned.
3. VDE 0701, Part 2, contains regulations on the repair, modification and testing of mains-operated electronic devices and their accessories.
4. Before delivery, the device and the connecting leads (including any protective earth conductor fitted) must undergo visual inspection, and the insulation resistance and the equivalent leakage current must be measured according to VDE 0701, part 200. The low-resistance continuity of the protective earth conductor must be verified by measurement to VDE regulation 0701, part 1.
5. The regulations of the country concerned must also be observed.
6. Only genuine parts must be used for replacing components marked with the symbol .

Rear panel removal

Unscrew the five rear panel screws **R** to remove the rear panel. Insert screw driver into recess **V**. Depress interlocking and at the same time slide rear panel to the rear (fig. 1).

How to move the chassis into the service position

1. Hold and lift the rear of the chassis and gently pull the chassis toward you (fig. 2).
2. Undo the cable fixtures. Turn the chassis through 90° anti-clockwise and place the chassis behind the set (fig. 3).
3. After servicing ensure all wiring is returned to its original position and fixed.

Service position for the signal board

1. Remove the signal board from the main chassis (Basic board), ensuring all leads are disconnected.
2. Remove the four screws (A) (fig. 4) from the plastic AV cover and unclip the AV cover from the signal board.
3. Remove the front metal cover from the signal board (fig. 5). Do the same for the rear metal cover (fig. 6).
4. Fit the three extension leads to the signal board making sure that the signal board does not touch the basic board (fig. 7).
5. After servicing ensure all wiring is returned to its original position and fixed.

Note:

The extension lead wire kit is supplied as a service kit. (Part number 291-90274.920).



Repair information for the signal board MediaPlus

There is any error on the signal board, please proceed as described:

- Remove the EROM (I 1891) from the printed circuit board. The TV is able to keep running.
- If you get a static picture, the EROM is out of order (possible geometry errors remain unconsidered).
- If the error is still there, it's because of another component on the signal board.
- If you want to change the signal board at the service head office in Kronach, insert the EROM from the damaged signal board into the new one. So you don't need to make the alignment and the programming of the TV set.

Important!

Please remove the AV cover at the damaged signal board.



Recommandations pour la protection contre les charges électrostatiques

1. Postes de travail MOS protégés électrostatiquement

La manipulation de composants sensibles aux charges électrostatiques doit impérativement se faire à un poste de travail MOS protégé électrostatiquement. Un tel poste de travail MOS protégé électrostatiquement met tous les matériaux conducteurs à la masse par l'intermédiaire de résistances de décharge, y compris la personne qui y travaille. Les non-conducteurs sont déchargés par ionisation de l'air. L'intégration de fers à souder et d'appareils de mesure dans le poste de travail MOS protégé électrostatiquement n'est admissible que par l'intermédiaire de transformateurs de séparation intégrés à chacun des appareils. Les terres des appareils de mesure sont également mises à la masse par l'intermédiaire de résistances de décharge.

2. Emballages de sécurité faits de matériaux conducteurs

Pour les protéger contre les charges électrostatiques, les composants sensibles sont emballés et transportés dans des matières plastiques conductrices d'électricité. Les matières plastiques conductrices existent en tant que sachets de protection noirs ou transparents, mousses, feuilles et aussi en tant que conteneurs. Les composants sensibles ne doivent être sortis de leur emballage conducteur ou y être emballés qu'au poste de travail MOS électrostatiquement protégé.

Consignes et prescriptions de sécurité

1. Les remises en état, modifications et examen d'appareils électroniques exploités sur réseau, et leurs accessoires, ne doivent être exécutés que par des professionnels.
2. On appliquera les prescriptions et consignes de sécurité selon VDE 0701, partie 200, et les prescriptions et consignes de sécurité du pays respectif!
3. VDE 0701, partie 200, comporte des prescriptions sur la remise en état, modification et examen d'appareils électroniques exploités sur réseau, et leurs accessoires.
4. Avant la livraison de l'appareil, il faut effectuer un examen visuel de l'appareil et câbles de branchement (et si existant de la terre), et la mesure de la résistance d'isolation et du courant de fuite de remplacement selon VDE 0701, partie 200. Le passage de basse impédance de la terre doit être démontré par une mesure conformément à la prescription VDE 0701, partie 1.

5. Les prescriptions du pays respectif doivent être également observées.
6. Les éléments caractérisés avec le symbole ne doivent être remplacés que par des pièces originales.

Démontage du panneau arrière

Pour enlever la paroi arrière, dévissez les cinq vis **R**. Introduire un petit tournevis dans l'ouverture **V**. Pousser le verrouillage vers le bas et faire glisser en même temps le paroi arrière vers l'arrière (fig. 1).

Châssis d'appareil en position de réparation

1. Lever légèrement le châssis à l'arrière et le sortir avec précautions de l'appareil vers l'arrière (fig. 2).
2. Desserrer les serre-câble. Tourner le châssis à 90° dans le sens inverse des aiguilles d'une montre et placer le châssis derrière l'appareil (fig. 3).
3. Une fois la réparation/réglage effectuée, les câbles doivent être remis dans leur position initiale et fixes.

Réparation de la carte à circuits imprimés «Signaux»

1. Enlever la carte signaux du châssis principal (carte mère); auparavant, tous les câbles de raccordement doivent être débranchés.
2. Dévisser les quatre vis (A) (fig. 4) du recouvrement AV en plastique et retirer celui-ci de la carte signaux en ôtant les clips.
3. Enlever le recouvrement métallique frontal de la carte signaux (fig. 5). Procéder de la même manière pour le recouvrement métallique arrière (fig. 6).
4. Raccorder les trois câbles de rallonge à la carte signaux; ce faisant, veiller à ce que la carte signaux ne touche pas à la carte mère (fig. 7).
5. Une fois la réparation/réglage effectuée, tous les câbles doivent être remis dans leur position initiale et fixes.

Remarque:

les câbles de rallonge sont fournis comme jeu de pièces de réparation sous le numéro de référence 291-90274.920.



Note d'information pour la maintenance du circuit signal MediaPlus.

En cas de panne sur la platine signal veuillez procéder comme suit:

- Retirer l'EAROM (I 1891) de son support. L'appareil est toujours apte à fonctionner.
- Si vous obtenez une image statique, l'EAROM est défectueuse (erreurs possibles et inconsidérées de la géométrie d'image).
- Si la panne persiste, c'est qu'il s'agit d'un autre composant sur le module signal.
- Si vous voulez changer la platine signal auprès de votre fournisseur Loewe Kronach, conservez l'EAROM de la platine défectueuse afin de l'insérer dans la nouvelle platine. De ce fait, vous n'aurez pas besoin de réaligner et de reprogrammer le téléviseur.

Important!

Oter de la platine défectueuse que vous conserverez le couvercle AV.



Nota per la protezione da scariche elettrostatiche

1. Posti di lavoro MOS protetti elettrostaticamente

La manipolazione di componenti sensibili alle scariche elettrostatiche deve essere eseguita a posti di lavoro MOS protetti da queste scariche. Un posto di lavoro MOS protetto dalle scariche elettrostatiche convoglia a terra tutti i materiali conduttori compresa la persona mediante resistenze di scarica. Gli isolatori vengono scaricati mediante ionizzazione dell'aria. L'integrazione di saldati e apparecchi di misura nel posto di lavoro MOS protetto è possibile solo attraverso trasformatori di separazione in ogni apparecchio usato. Anche le massa degli apparecchi di misura vengono scaricate a terra mediante resistente di scarica.

2. Imballaggio protetto mediante materiali conduttori

Per proteggere le componenti dalle scariche elettrostatiche vengono usati degli imballaggi e dei mezzi di trasporto di materiale sintetico conduttore. Esistono imballaggi di materiale sintetico conduttore sottoforma di sacchetti di protezione trasparenti o neri, materiale schiumoso, fogli e contenitori. Componenti sensibili devono essere tolti, risp. messi negli imballaggi di materiale conduttore solo in un posto di lavoro MOS protetto.

Note per la sicurezza/disposizioni

1. Riparazioni, modifiche e controlli su apparecchiature elettroniche ed accessori collegati alla rete elettrica devono essere eseguiti esclusivamente da personale esperto.
2. Si applicano le disposizioni e le note per la sicurezza della norma VDE 0701, parte 200, e quelle del Paese di installazione.
3. VDE 0701, parte 200, riporta le disposizioni per le riparazioni, modifiche e controlli su apparecchiature elettroniche ed accessori collegati alla rete elettrica.
4. Prima della consegna, si deve effettuare un controllo visivo dell'apparecchio e dei cavi di collegamento (anche del conduttore di protezione, se presente) nonché la misurazione della resistenza di isolamento e della corrente deviata sostitutiva secondo la norma VDE 0701, parte 200. La continuità a basso valore ohmico del conduttore di protezione va dimostrata secondo la norma VDE 0701, parte 1.
5. Si devono rispettare anche le disposizioni relative in vigore nel Paese di installazione.
6. Componenti contrassegnati con il simbolo  devono essere sostituiti solo con ricambi originali.

Smontaggio del pannello posteriore

Per togliere il pannello si svitano le cinque viti **R** del pannello posteriore. Introdurre la punta del cacciavite nelle fessure **V**. Spingere il bloccaggio verso il basso e contemporaneamente far scivolare il pannello posteriore indietro (fig. 1).

Come si porta il telaio in posizione di riparazione

1. Alzare leggermente il telaio sulla parte posteriore ed estrarlo cautamente dalla parte posteriore dell'apparecchio (fig. 2).
2. Allentare i fissaggi dei cavi. Girare il telaio di 90° verso sinistra e appoggiare il telaio dietro l'apparecchio (fig. 3).
3. Dopo la riparazione/regolazione riportare i cablaggi nella posizione originaria e fissarli.

Posizione di riparazione della piastra segnale

1. Staccare la piastra segnale dal telaio principale (piastra di base). Prima staccare tutti i cablaggi.
2. Togliere le quattro viti (A) (fig. 4) dal coperchio di plastica dell'AV e, premendo i clip, smontare il coperchio dell'AV dalla piastra segnale.
3. Togliere il coperchio di metallo anteriore dalla piastra segnale (fig. 5). Ripetere l'operazione per il coperchio di metallo posteriore (fig. 6).
4. Collegare i tre cavi di prolunga alla piastra segnale facendo attenzione che la piastra di base non tocchi la piastra segnale (fig. 7).
5. Dopo la riparazione/regolazione, riportare i cablaggi nella posizione originaria e fissarli.

NOTA:

cavi di prolunga sono forniti come set di riparazione con il N° di codice 291-90274.920.



Nota di riparazione della piastra segnale MediaPlus

In caso di guasto della piastra segnale seguire le seguenti indicazioni:

- Estraiete EAROM (I 1891) dal modulo. L'apparecchio è ancora funzionante.
- Se adesso, l'immagine è ferma l'EAROM è difettoso, (eventuali errori sulla geometria non sono da prendere in considerazione).
- Se il guasto si presenta ancora, esso è da ricercare su un altro componente della piastra segnale.
- In caso di permuta della piastra difettosa, tramite la Loewe Kronach, trattenete presso di voi l'EAROM, onde evitare la perdita dei dati memorizzati.

Importante:

Trattenete dal modulo difettoso coperchio AV.



Advertencia para la protección contra cargas electrostáticas

1. Protección contra cargas electrostáticas en puestos de manipulación de módulos MOS

La manipulación de piezas sensibles contra cargas electrostáticas debe realizarse en puestos de manipulación de módulos MOS protegidos contra dichas cargas. Para que un puesto de manipulación de módulos MOS esté protegido contra descargas electrostáticas, todos los materiales conductores, incluido el operario, deben conectarse a tierra mediante resistencias de descarga. Los elementos no conductores deben descargarse mediante un ionizador de aire. La integración de soldadores y aparatos de medición en los puestos de manipulación de módulos MOS sólo se puede realizar con transformadores separadores en cada aparato utilizado. También deben conectarse a tierra las masas de los aparatos de medición utilizando resistencias de descarga.

2. Embalaje protegido con materiales conductores

Para la protección contra las cargas electrostáticas se utilizan materiales sintéticos conductores para el embalaje y el transporte. Los materiales sintéticos conductores están disponibles en forma de bolsas protectoras negras o transparentes, gomaespuma, películas y envases.

Las piezas electrostáticamente sensibles deben embalsarse y/o desembalsarse solamente en puestos de manipulación de módulos MOS.

Advertencias y normas de seguridad

1. Las puestas a punto, cambios y revisiones de aparatos electrónicos alimentados por la red y sus accesorios, sólo deben realizarse por personas especializadas.
2. Son aplicables las advertencias y normas de seguridad detalladas en la norma VDE 0701, apartado 200 y las correspondientes de cada país.
3. El apartado 200 de la norma VDE 0701 describe las puestas a punto, cambios y revisiones de aparatos electrónicos alimentados por la red y sus accesorios.
4. Antes de efectuar el suministro del aparato debe realizarse una comprobación visual del mismo y de las líneas de conexión (y, en su caso, de la línea protectora), así como una medición de la resistencia de aislamiento y de la corriente sustitutiva de escape según VDE 0701, apartado 200. Debe verificarse la baja resistencia de la línea protectora recogida en la norma VDE 0701, apartado 1.

5. Se han de tener en cuenta además las normas de los países correspondientes.
6. Las piezas marcadas con el símbolo  sólo podrán reemplazarse por piezas originales.

Medición de alta tensión

1. Ajustar el brillo al mínimo.
2. Medir la alta tensión. El aparato debe marcar $29,0 \text{ kV} \pm 0,7 \text{ kV}$. En caso de excederse el límite de tolerancia, debe corregirse inmediatamente para prevenir el fallo prematuro de los componentes.
3. Para limitar las posibles radiaciones de rayos X, es importante utilizar exclusivamente el tubo de imagen recomendado.

Advertencia: Es importante utilizar un voltímetro preciso y revisado periódicamente.

Desmontaje del panel posterior

Para retirar el panel posterior deben extraerse los cinco tornillos **R** que lo fijan al aparato. El destornillador debe introducirse en la ranura **V**. Empujar el cierre hacia abajo, deslizando al mismo tiempo el panel posterior hacia atrás (Figura 1).

Colocación del chasis del aparato en posición de reparación

1. Levantar ligeramente el chasis por la parte trasera y tirar con cuidado hacia atrás para extraerlo del aparato (Figura 2).
2. Liberar las sujeciones de los cables. Girar el chasis 90° en sentido contrario al de las agujas del reloj y dejarlo detrás del aparato (Figura 3).
3. Una vez finalizada la reparación o puesta a punto, colocar y fijar los cables en su posición original.

Posición de reparación del circuito impreso de la tarjeta de señales

1. Extraer la tarjeta de señales del chasis principal (tarjeta básica); antes han de retirarse todos los cables de conexión.
2. Extraer los cuatro tornillos (A) (Figura 4) de la cubierta plástica de AV y retirar ésta desencajándola de la tarjeta de señales.
3. Retirar la cubierta metálica delantero de la tarjeta de señales (Figura 5). Repetir el proceso con la cubierta metálica posterior (Figura 6).
4. Conectar los tres cables alargadores a la tarjeta de señales; tener cuidado de que la tarjeta de señales no entre en contacto con el circuito impreso de la tarjeta básica (Figura 7).
5. Una vez finalizada la reparación o puesta a punto, colocar y fijar los cables en su posición original.

Nota:

Los cables alargadores se pueden encargar como juego de piezas de recambio indicando el número de pedido 291-90274.920.



Notas para la reparación de la tarjeta de señales MediaPlus

En caso de avería, rogamos dar los siguientes pasos:

- Extraer la EAROM (I 1891) de la placa de circuito impreso. Esto no impide que el aparato siga funcionando.
- Si aparece una imagen fija, significa que la EAROM está defectuosa (no se consideran los posibles fallos en la geometría de la imagen).
- Si el fallo persiste, la avería se encuentra en otro componente de la tarjeta de señales.
- Para cambiar la tarjeta de señales en nuestro Centro de Atención al Cliente en Kronach, instalar la EAROM de la tarjeta de señales defectuosa en la tarjeta nueva. Así se ahorra la comprobación y programación del aparato.

Importante!

Retirar los de la tarjeta de señales la cubierta de AV.



Aanwijzing ter bescherming tegen elektrostatica

1. Elektrostatisch beveiligde MOS-werkplekken.

De omgang met voor elektrostatica gevoelige componenten moet op een elektrostatisch beveiligde MOS-werkplek plaatsvinden.

Bij een elektrostatisch beveiligde MOS-werkplek worden alle geleidende materialen en de persoon zelf via ontladingsweerstand geaard. Niet-geleiders worden door luchtionisatie ontladen. De integratie van soldeerbouten en meetapparaten in de beveiligde MOS-werkplek is alleen met een scheidingstransformator in elk van de gebruikte apparaten mogelijk. De massa's van de meetapparaten worden eveneens met ontladingsweerstand geaard.

2. Veilige verpakking door geleidende materialen.

Ter bescherming tegen elektrostatica worden elektrisch geleidende kunststoffen voor de verpakking en de transportmiddelen gebruikt. Geleidende kunststoffen zijn als zwarte of transparante beschermzakjes, schuimstof, folie en als container verkrijgbaar.

Gevoelige componenten mogen alleen op de beveiligde MOS-werkplek uit de verpakking worden gehaald resp. worden verpakt.

Veiligheidsinstructies/voorschriften

- Elektronische apparaten met netvoeding en hun toebehoren mogen uitsluitend door vakkundige personen worden gerepareerd, gewijzigd en gecontroleerd.
- De voorschriften en veiligheidsinstructies volgens VDE 0701, deel 200, en de voorschriften en veiligheidsinstructies van het desbetreffende land zijn van kracht!
- VDE 0701, deel 200, bevat de voorschriften voor de reparatie, de wijziging en de controle van elektronische apparaten met netvoeding en hun toebehoren.
- Voordat het toestel wordt afgeleverd, moeten het toestel en de aansluitleidingen (en voor zover aanwezig, de aarddraad) aan een visuele controle worden onderworpen en de isolatieweerstand en de reserve-lekstroom conform VDE 0701, deel 200, worden gemeten. De laagohmige doorgang van de aarddraad moet door meting volgens voorschrift VDE 0701, deel 1, worden aangetoond.
- Tevens dienen de voorschriften van het desbetreffende land in acht te worden genomen.
- Componenten die gekenmerkt zijn met het symbool , mogen uitsluitend door originele reserveonderdelen worden vervangen.

Demontage van de achterwand

Om de achterwand te verwijderen, moeten de vijf schroeven **R** uit de achterwand worden gedraaid. Steek de schroevendraaier in de uitsparing **V**. Druk de vergrendeling naar beneden en schuif tegelijkertijd de achterwand naar achteren (afb. 1).

Chassis van het toestel in de reparatiestand zetten

- Til het chassis aan de achterkant iets op en schuif het voorzichtig naar achteren uit het toestel (afb. 2).
- Maak de kabelbevestigingen los. Draai het chassis nu 90° tegen de klok in en zet het chassis achter het toestel neer (afb. 3).
- Na de reparatie/instelling moeten de kabels weer op de oorspronkelijke positie worden aangebracht en bevestigd.

Reparatiestand voor printplaat Signal-Board

- Verwijder de printplaat Signal-Board van het hoofdchassis (Basic-Board); eerst moeten alle aansluitkabels worden losgetrokken.
- Draai de vier schroeven (A) (afb. 4) uit de kunststof-AV-afdekking en wip de AV-afdekking van de printplaat Signal-Board.
- Verwijder de metalen afdekking van de printplaat Signal-Board (afb. 5). Doe hetzelfde bij de achterste metalen afdekking (afb. 6).
- Sluit de drie verlengkabels op de printplaat Signal-Board aan; let erop, dat de printplaat Signal-Board de printplaat Basic-Board niet raakt (afb. 7).
- Na de reparatie/instelling moeten alle kabels weer op de oorspronkelijke positie worden aangebracht en bevestigd.

Aanwijzing:

De verlengkabels zijn als reparatie-onderdeel onder bestelnummer 291-90274.920 verkrijgbaar.



Reparatie-instructie Signal - Board MediaPlus

Bij fouten op de Signal-Board gaat u als volgt te werk:

- Verwijder de E.AROM (I 1891) uit de printplaat. Het toestel is nog steeds functioneel.
- Als nu een stilstaand beeld ontstaat, is de E.AROM defect, (met eventuele geometriefouten wordt hierbij geen rekening gehouden).
- Als de fout blijft bestaan, ligt dat aan een andere component op de Signal-Board.
- Als u de Signal-Board bij de service-centrale Kronach wilt vervangen, plaatst u de E.AROM van de defecte Signal-Board in de nieuwe. Op die manier hoeft u het toestel niet opnieuw af te stemmen en te programmeren.

Balansrijk!

Verwijder bij een defect Signal-Board de AV-afdekking.

Demontage der Rückwand
Gerätechassis in Reparaturstellung bringen

Rear panel removal
How to move the chassis into the service position

Démontage du panneau arrière
Come si porta il telaio in posizione di riparazione

Smontaggio del pannello posteriore
Châssis d'appareil en position de réparation

Desmontaje del panel posterior
Colocación del chasis del aparato en posición de reparación

Demontage van de achterwand
Chassis van het toestel in de reparatiestand zetten

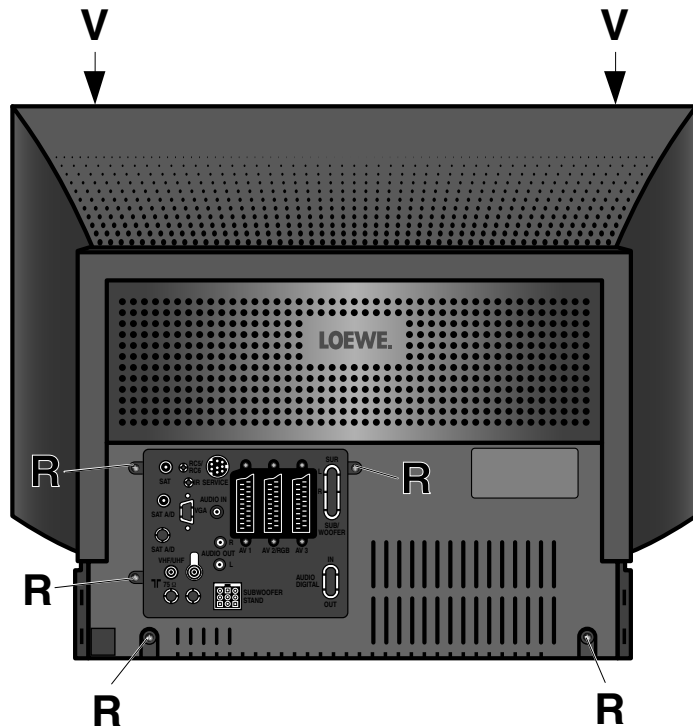


Abb.1
 Fig.1
 Afb. 1

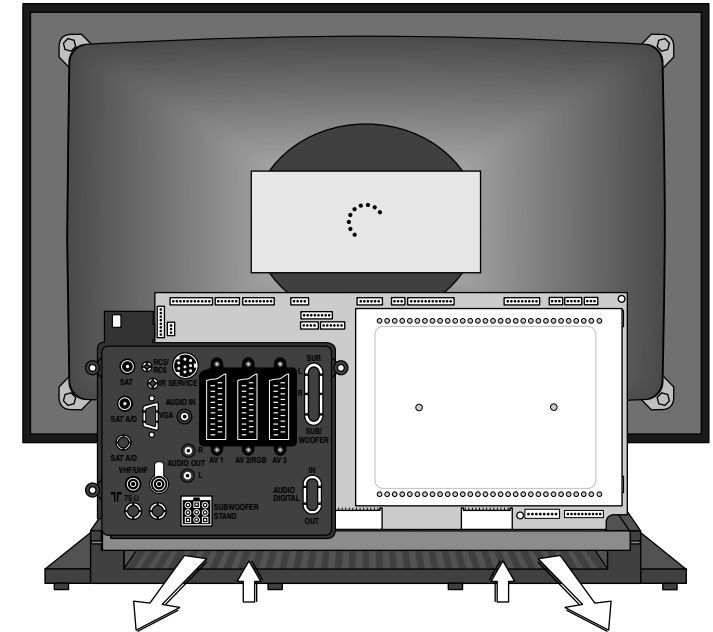


Abb.2
 Fig.2
 Afb. 2

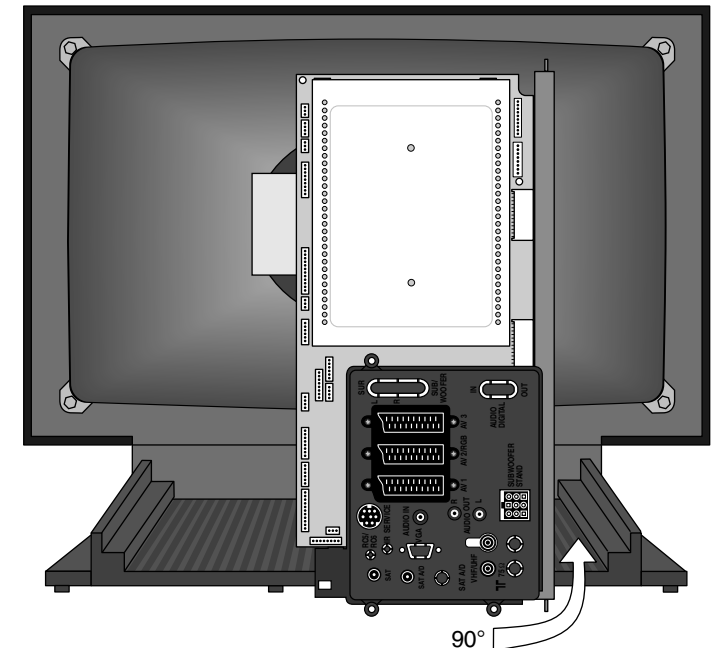


Abb.3
 Fig.3
 Afb. 3

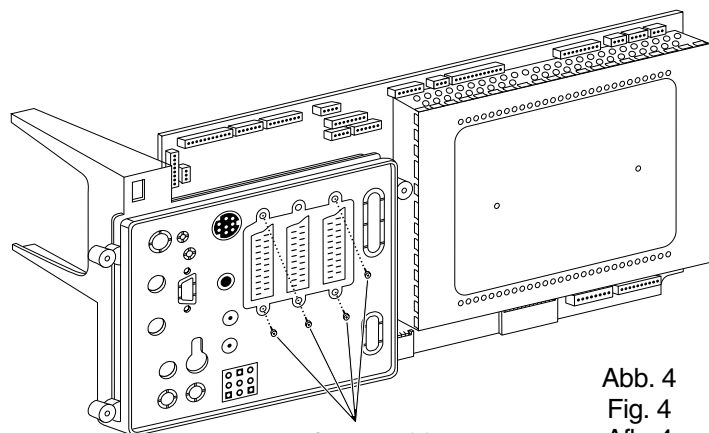


Abb. 4
Fig. 4
Afb. 4

AV Abdeckung
AV Cover
Couverture AV
Coperchio AV
Cubierta AV
AV-afdekking

Schrauben (A)
Screws (A)
Vis (A)
Viti (A)
Tornillos (A)
Schroeven (A)

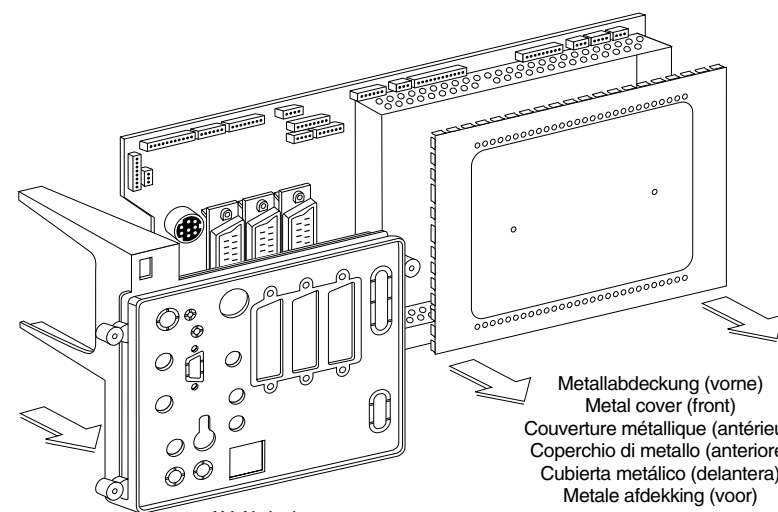


Abb. 5
Fig. 5
Afb. 5

AV Abdeckung
AV Cover
Couverture AV
Coperchio AV
Cubierta AV
AV-afdekking

Metallabdeckung (vorne)
Metal cover (front)
Couverture métallique (antérieur)
Coperchio di metallo (anteriore)
Cubierta metálica (delantera)
Metale afdekking (voor)

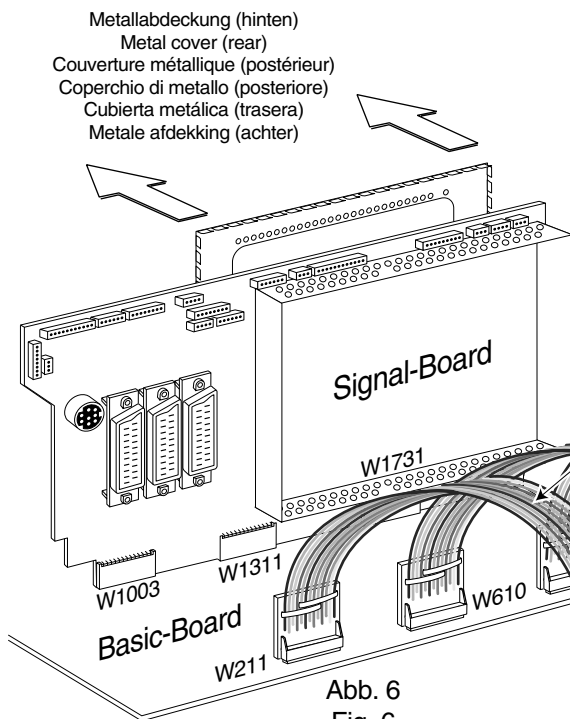


Abb. 6
Fig. 6
Afb. 6

Metallabdeckung (hinten)
Metal cover (rear)
Couverture métallique (postérieur)
Coperchio di metallo (posteriore)
Cubierta metálica (trasera)
Metale afdekking (achter)

Verlängerungskabel (Bestell-Nr. 291-90274.920)
Extension cable (Part number 291-90274.920)
Câble de prolongement (Numéro de commande 291-90274.920)
Cavo di prolunga (Numero d'ordinazione 291-90274.920)
Cable alargador (n° de pedido 291-90274.920)
Verlengkabel (Bestelnr. 291-90274.920)

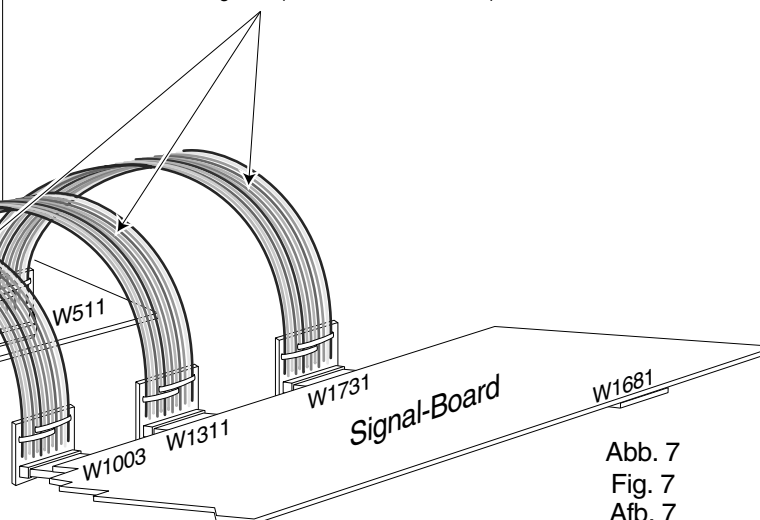


Abb. 7
Fig. 7
Afb. 7

The diagram illustrates the internal wiring of the SAT-Receiver VI. It shows the following components and their connections:

- SAT-Tuner** and **SAT A/D-Tuner** are connected to the **DVB Free Decoder** via connectors W280, W100, and W120.
- The **DVB Free Decoder** is connected to the **Signal-Board** via connectors W7506, W7611, W7680, W7781, W7943, W7120, W7100, W7916, and W620.
- The **Signal-Board** features connectors W1101, W1506, W1611, W1681, W1076, W1943, V24, and Scart 1, Scart 2, Scart 3.
- Various external connectors are labeled with part numbers: (1) 171-87829013, (5) 171-8852001, (10) 171-87534008, (6) 171-87829001, (9) 171-88955017, (12) 171-86185010, (13) 171-86186013, and (3) 171-85855008.



			61401.62	61402.62	61404.63	61405.52	61405.62	61406.63	61450.62	61465.62	61466.62
N 471	85909052	KABELBAUM 2-POL1400LG SW/GN BV171-85909		X							
	85909053	KABELBAUM 2-POL1000LG SW/GN BV171-85909			X		X	X	X		
N 472	88243053	KABELB. 3/2POL 1000LG GR LV171-88243									X
	88247051	KABELB. 3/2POL 1000LG GR/WS LV171-88247	X			X		X	X	X	
	88247052	KABELB. 3/2POL 1400LG GR/WS LV171-88247		X							
N 475	88186051	MASSELEITUNG GRUEN 550MM 1X0,5MM2 LV			X	X	X				
N 481	85909051	KABELBAUM 2-POL1000LG SW/GE BV171-85909		X	X		X	X	X		
N 482	88243052	KABELB. 3/2POL 1000LG OR LV171-88243									X
	88247053	KABELB. 3/2POL 1000LG OR/WS LV171-88247	X	X		X		X	X	X	
N 532	87586052	KABELBAUM H-ABLENK. 2POL 600LG USA LV						X			
	87586053	KABELBAUM H-ABLENK. 2POL 600LG USA LV	X								
	87814050	KABELB.H-ABLENKUNG 550LG BV171-87814								X	X
	87844050	KABELBAUM 2-POL 550LG BL/GE BV171-87844							X		
	87983051	KABELBAUM 2-POL 550LG H-A/UL LV171-87983		X	X	X	X	X			
N 560	86188	KABELBAUM 4-POL 500LG NATUR LV171-86188						X			
N 569	88205051	KABELBAUM V-ABLENKUNG 2-POL 550LG LV		X					X		
	88206051	KABELBAUM V-ABLENKUNG 2/3-POL 550LG LV			X	X	X				
	88207051	KABELBAUM V-ABLENKUNG 2/3-POL. 550LG LV								X	X
	88218051	KABELBAUM V-ABLENKUNG 2-POL. 550LG	X					X			
N 881	87338001	KABEL IR 2POL LV 169-87338			X				X		
N3001	87838050	KABELBAUM 1-POL 400LG GRUEN BV171-87838	X	X	X	X	X	X	X	X	X
N3051	87886001	KABELBAUM 9-POL 400LG NATUR LV171-87886	X	X	X	X	X	X	X		
	88129001	KABELB. 9-POL 400LG UL NATUR LV171-88129								X	X
N3258	86191006	KABELBAUM 3-POL 200LG NATUR LV171-86191		X	X	X	X	X	X		
	88452001	KABELBAUM 3-POL. 200LG LV171-88452								X	X
	88452101	KABELBAUM 3-POL. 200LG LV171-88452	X								
	88481001	KABELBAUM 3/2-POL. 120LG LV171-88481						X			
N3550	87534006	KABELBAUM 5-POL. 500LG NATUR	X	X	X	X	X		X	X	X
	87534009	KABELBAUM 5-POL. 550LG NATUR						X			
N6001	87154002	ERDUNGSBAND 600MM LG.									X
	87154003	ERDUNGSBAND 770MM LG.	X	X	X	X	X		X	X	
N6002	87154002	ERDUNGSBAND 600MM LG.						X			
N8003	29158003	NETZKABEL DR. 3400MM 0,75 SW JST LV	X	X	X	X	X	X			
N8015	87878050	MASSELEITUNG GRUEN 300LG LV171-87878	X							X	X
N8081	85855006	KABELBAUM 8-POL1200LG SCHW. LV171-85855		X	X	X	X	X			
	85855056	KABELBAUM 8-POL 1200LG UL SW LV	X							X	
N8212	88211052	KABELBAUM 1-POL 650LG ESD LV171-88211	X	X	X	X	X	X		X	X
N8214	88211052	KABELBAUM 1-POL 650LG ESD LV171-88211								X	X
N8521	87791001	KABELBAUM 11POL. 800LG. NATUR	X	X	X	X	X	X			
	87791002	KABELBAUM 11-POL 600LG NATUR LV171-87791								X	X
N8611	88204052	KABELBAUM NETZV. 2-POL 500LG SW/SW LV	X	X	X	X	X	X	X	X	
	88204053	KABELBAUM NETZV. 2-POL 700LG SW/SW LV					X	X			X
N8613	88355052	KABELBAUM NETZV. 3(5)-POL 600LG NAT LV	X	X	X	X	X	X	X	X	X
	88355053	KABELBAUM NETZV. 3(5)-POL 900LG NAT LV					X	X			X



Anordnung der SERVICE-Mode-Befehle auf der Fernbedienung
Arrangement of the SERVICE Mode commands on the remote control
Arrangement des instructions du mode SERVICE sur la télécommande
Ordine dei comandi nel “modo di SERVIZIO” sul telecomando
Disposición de los comandos del modo SERVICIO en el mando a distancia
Rangschikking van de SERVICE-mode-functie's op de afstandsbediening

Einstieg in den Service-Mode

- *) Funktionstaste  auf der Ortsbedienung fünfmal drücken (Anzeige „Service“ markiert), anschließend innerhalb 1 sec. Taste „M“ auf der Fernbedienung zu drücken.

Entering Service Mode

- *) On the local control press function key  five times (indication “Service” will appear), afterwards within a sec. Press key “M” on the remote control.

Entrée dans le mode maintenance

- *) Poussez cinq fois la touche fonction  sur la commande locale (indication «Service» apparaît), après cela poussez la touche «M» sur la télécommande en une sec.

Attivazione del modo di servizio

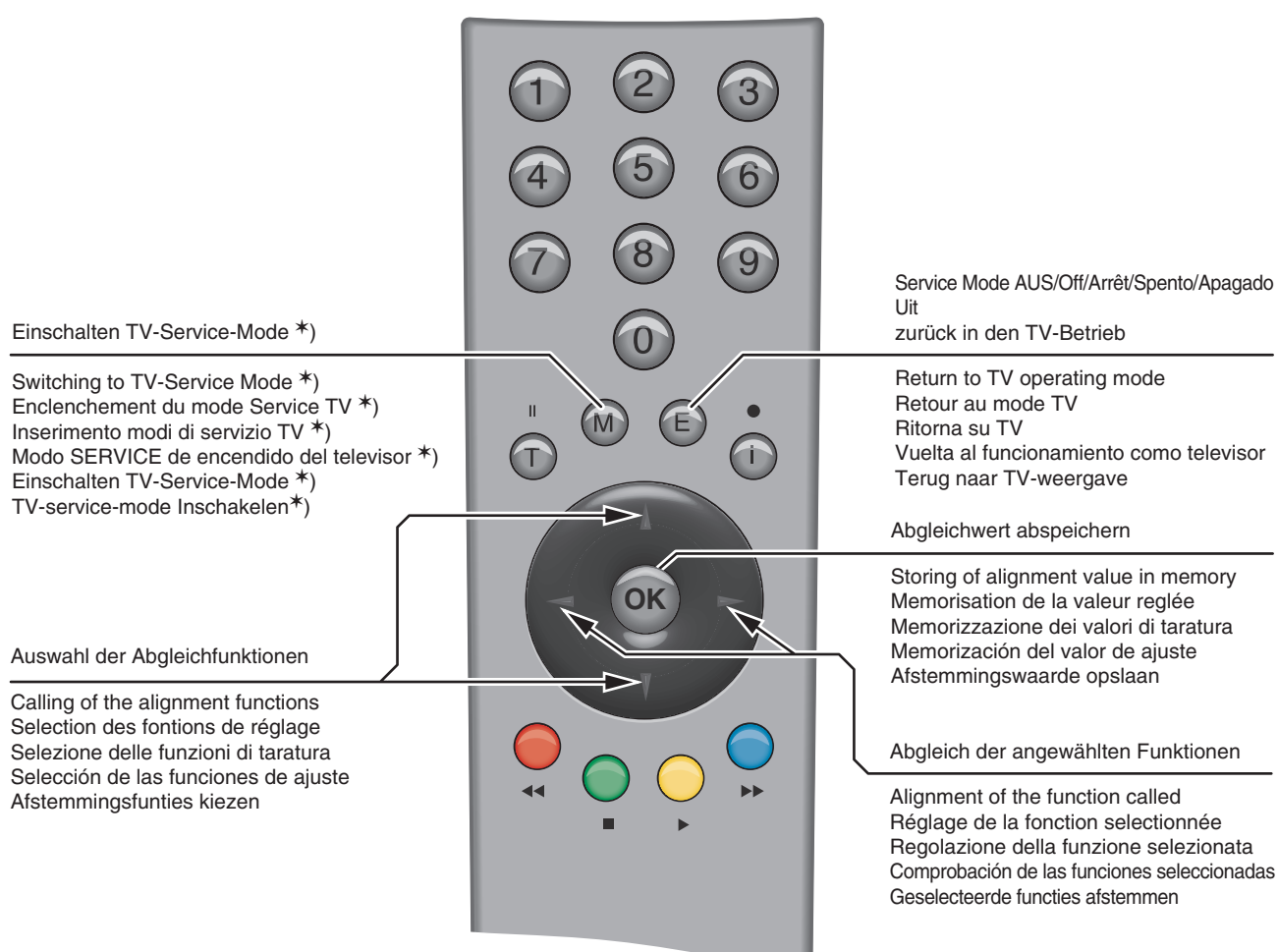
- *) Sui comandi nell'apparecchio premere cinque volte il tasto funzione  (indicatore „Service“ appare), successivamente entro un sec. premere il tasto “M” con il telecomando.

Entrada al modo SERVICE

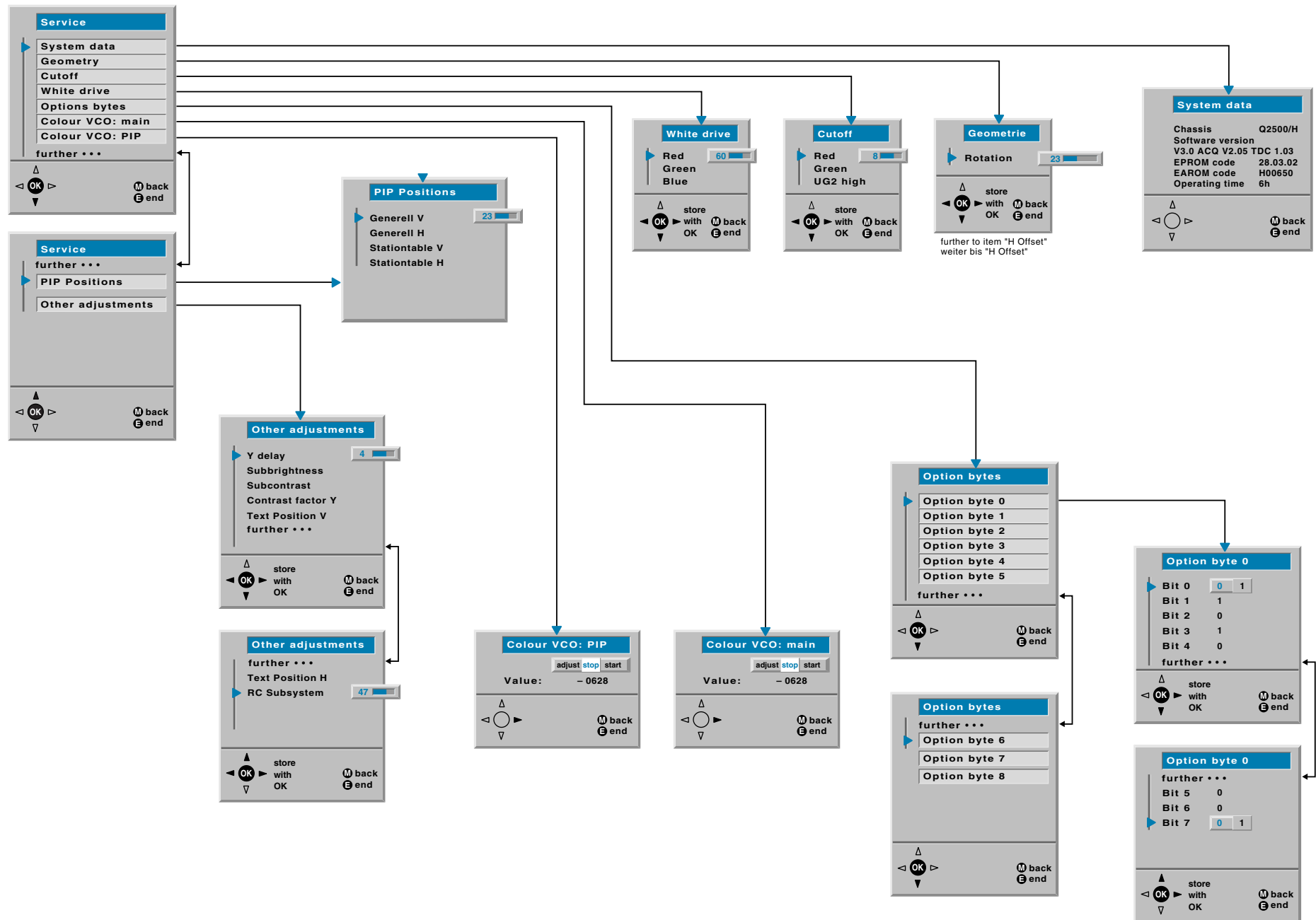
- *) Pulsar cinco veces la tecla de función  en el televisor (aparece el diálogo “Service”) y a continuación pulsar el botón “M” del mando a distancia en el plazo de 1 segundo.

Overschakelen op de service-mode

- *) Druk vijf keer op de functietoets  op het toestel (indicatie “Service” verschijnt), druk aansluitend binnen 1 sec. op de toets “M” op de afstandsbediening.



Service Menü • Service menu • Menu de service • Menu di servizio • Menú SERVICE • Service menu (MediaPlus)





Abgleich-Anweisung

Service-Mode MediaPlus

30.10.99

1. Funktion

Der Service-Mode macht den Abgleich variabler EARM-Werte möglich und gestattet die Geräteprogrammierung über Service-Schnittstelle mittels PC/TV-Programmer. Der PC/TV-Programmer verbindet einen vorhanden PC über V24 mit der Service-Schnittstelle vom TV. Mit Hilfe der beiliegenden Software ist es dem Außendienstmitarbeiter möglich, eine für seinen Bezirk übliche Standard-Geräteprogrammierung (Kanalnummern, Programmnamen z.B. im Bereich von Kabelnetzen) in wenigen Sekunden mühelos und fehlerfrei durchzuführen. Auch kann damit das EARM editiert und als Datei im PC abgespeichert werden.

Achtung!

Ein Software-Update für das Digital/TV - Board (DVB) ist **nur** über den PC/TV-Programmer möglich!

Den PC/TV-Programmer (Art.-Nr. 87933-050) beziehen Sie bitte über die Loewe-Kundendienstzentrale Kronach.

Der PC/TV-Programmer ist für die Chassisgeneration MediaPlus (Q 2400 / Q 2500) und folgende vorgesehen. Für ältere Chassisgenerationen ist er nicht verwendbar.

Eine detaillierte Gebrauchsanweisung liegt dieser nützlichen Servicehilfe bei, so daß an dieser Stelle nähere Ausführungen entfallen können.

Die PC/TV-Programmer Software V2.6 wird für Chassis Q 2500 zwingend benötigt. Die SW-Version V2.6 ist abwärtskompatibel und bedient somit auch das Chassis Q 2400. Update auf V2.6 über ISDN-InfoTip und Ftp-Server - siehe TK-Info Nr. 2001/4 - möglich. <http://ftp.loewe/public/TKService/Software/>

2. Einstieg in den Service-Mode

Die Einstellfolge für den Service-Mode entnehmen Sie bitte vom Text des Bildes: „Anordnung der Service-Mode Befehle auf der Fernbedienung“ (S. 25). Befindet sich nun das Gerät in der Service-Mode-Grundeinstellung, wird dies mit folgender OSD-Einblendung (Service-Menü) dokumentiert.

3. Hinweise zum Geometrieabgleich

Vertikalamplitude, Vertikal-Position, V-Linearität, V-Symmetrie, Horizontal-Amplitude, H-Phase, Ost/West, Trapez usw.

werden getrennt für 50/60Hz Bildfrequenzen abgespeichert und müssen deshalb getrennt eingestellt werden:

Bildröhre:	4:3	16:9
- 50Hz	Testbild: 4:3	Testbild: 16:9
- 60Hz	4:3	16:9



Adjustment procedures

Service-Mode MediaPlus

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1. Function

Service mode enables the comparison of EARM variables and permits unit programming via the service interface using a PC/TV programmer. The PC/TV programmer connects an available PC to the service interface of the TV via V24. Using the software provided, the service representative can easily perform the standard unit programming required for his region (channel numbers, program names, e.g. for cable networks) within seconds. This can also be used to edit and save EARM as a file on the PC.

Important

A software update for the digital/TV board (DVB) is **only** possible via the PC/TV programmer.

The PC/TV programmer is available from the Loewe customer service centre in Kronach (Item No. 87933-050).

The PC/TV programmer is intended for the MediaPlus chassis generation (Q 2400 / Q 2500) and subsequent generations. It is not suitable for older chassis generations.

No further explanations are required at this point, since detailed operating instructions are provided with this useful service facility.

The PC/TV Programmer software V2.6 is absolutely essential for chassis Q 2500. The SW version V2.6 is downward-compatible and therefore also operates chassis Q 2400. Update to V2.6 possible with ISDN-InfoTip and Ftp server – see TK Info no. 2001/4. <http://ftp.loewe/public/TKService/Software/>

2. Entering Service Mode

The Adjustment sequence for the service mode is indicated in the pictures: "Arrangement of the service mode commands on the remote control" (p. 25).

The set is now in the service mode basic routine and documents this with the following on-screen display (Servicemenu).

3. Instructions on Geometry Alignment

Vertical amplitude, Vertical position, Vertical linearity, Vertical symmetry, Hor. amplitude, Hor. phase, E-W corr., Trapezium comp., etc will be adjusted separately for 50/60Hz vertical frequencies. Therefore they have to be regulated separately.

CRT:	4:3	16:9
- 50Hz	Test pattern: 4:3	Test pattern: 16:9
- 60Hz	4:3	16:9



Instructions d'alignement

Service-Mode MediaPlus

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1. Fonction

Le mode Service permet l'alignement des valeurs variables de l'EARM ainsi que la programmation de l'appareil via l'interface de service, grâce au programmeur PC/TV. Le programmeur PC/TV permet de relier un PC à l'interface de service du téléviseur via V24. Grâce au logiciel fourni, le technicien d'entretien peut procéder à une programmation standard de l'appareil en quelques secondes et sans difficulté ni risque d'erreur (numéro de canal, nom du programme, p. ex. réseaux de câbles). L'EARM peut alors être également éditée et sauvegardée comme fichier sur le PC.

Attention !

La mise à jour du logiciel de la carte numérique/TV (DVB) n'est possible **que** via le programmeur PC/TV !

Le programmeur PC/TV (réf. 87933-050) est disponible auprès du service après-vente Loewe de Kronach.

Le programmeur PC/TV est conçu pour la génération de châssis MediaPlus (Q 2400 / Q 2500) et suivantes. Il ne peut être utilisé avec les générations de châssis antérieures.

La présente documentation de service après-vente inclut une notice d'utilisation détaillée, ce qui rend superflue toute explication détaillée ici.

Le logiciel V2.6 de programmation PC/TV doit être impérativement utilisé sur le châssis Q2500. Compatible en aval, la version V2.6 est également adaptée pour le châssis Q 2400. Une mise à jour de V2.6 est possible via ISDN-InfoTip et Ftp-Server – voir TK-Info n°2001/4. <http://ftp.loewe/public/TKService/Software/>

2. Entrée dans le mode maintenance

La série des réglages en mode service vous est donnée par le texte de l'image: "Arrangement des instructions du mode service sur la télécommande" (p. 25).

L'appareil se trouve alors en position de base du service maintenance et le documente par la superposition OSD (Menu de service) suivante.

3. Remarques concernant l'alignement de la géométrie

Ampl. verticale, Position verticale, Linéarité verticale, Symétrie verticale, Ampl. horizontale, phase horizontale, Correction E-O, Correction trapèze etc sont mémorisés séparément pour les fréquences d'image 50/60Hz et doivent donc être réglés séparément.

Écran:	4:3	16:9
- 50Hz	Mire de couleur: 4:3	Mire de couleur: 16:9 und 4:3
- 60Hz	4:3	16:9 und 4:3



Istruzioni Allineamento

Service-Mode MediaPlus

30.10.99

1. Funzione

La modalità Servizio consente la verifica di valori EARAM variabili e consente la programmazione dell'apparecchio tramite l'interfaccia di servizio e mediante il programmatore PC/TV. Tale programmatore collega un PC tramite l'interfaccia di servizio V24 della TV. Con l'ausilio del software è possibile per un dipendente in servizio esterno eseguire per la sua zona la normale programmazione standard dell'apparecchio (numeri canale, nomi di programma, ad es. nell'ambito di reti elettriche) in pochi secondi e senza troppe difficoltà o errori. Anche l'EARAM può essere editato in questo modo e memorizzato come file nel PC.

Attenzione!

Un aggiornamento del software della scheda digitale/TV (DVB) è possibile **solo** tramite il programmatore PC/TV!

Potete ordinare il programmatore PC/TV (no. art. 87933-050) presso il servizio assistenza clienti centrale Loewe di Kronach.

Il programmatore PC/TV è previsto per la generazione di telai MediaPlus (Q 2400 / Q 2500) e seguenti. Esso non è utilizzabile per generazioni di telai precedenti.

Sono allegate a queste istruzioni per l'uso Istruzioni dettagliate di assistenza; è possibile pertanto tralasciare in questa sede spiegazioni più dettagliate.

Il software programmatore PC/TV V2.6 per chassis Q 2500 è assolutamente necessario. La versione SW V2.6 è compatibile verso l'alto e quindi comanda anche chassis Q 2400. Aggiornamento possibile su V2.6 mediante ISDN-Info Tip e server Ftp – vedi TK-Info n° 2001/4.

<ftp://ftp.loewe/public/TKService/Software/>

2. Attivazione del modo di servizio

L'ordine dei lavori di regolazione nel modo di servizio - riportato nel testo del quadro "Ordine dei comandi di servizio sul telecomando" (p. 25).

Adesso l'apparecchio si trova in modalità Service - Posizione iniziale il che viene dimostrato dal seguente messaggio OSD (Menu di servizio).

3. Istruzione per l'allineamento geometrico

Ampiezza verticale, Posizione verticale, Linearità verticale, Simmetria verticale, Ampiezza orizzontale, Fase orizzontale, E-O, Correz. trapezoidale etc vengono memorizzati separatamente per le frequenze d'immagine 50/60Hz e quindi si devono impostare a parte.

Cinescopio:	4:3	16:9
- 50Hz	Immagine di prova:	Immagine di prova:
- 60Hz	4:3	16:9 und 4:3
	4:3	16:9 und 4:3



Instrucciones de ajuste

Modo Service MediaPlus

30.10.99

1. Funcionamiento

El modo de servicio posibilita el ajuste de los valores variables EARAM y permite la programación de los aparatos a través de la interfaz de servicio, mediante el programador PC/TV. El programador PC/TV conecta un PC ya montado en 24V con la interfaz de servicio del televisor. El técnico de servicio exterior de posventa puede, gracias al software suministrado, realizar en pocos segundos, sin esfuerzo y sin errores una programación de aparatos corriente en su región (números de canal, nombres de programas, p.ej. en el área de las redes de cables). También se puede editar el EARAM y se puede guardar como archivo en el PC.

¡Atención!

La actualización del software para la tarjeta digital/TV (DVB) **sólo** es realizable con el programador PC/TV.

Para adquirir el programador PC/TV (n°. art.: 87933-050) dirijase a la central de servicio al cliente de Loewe en Kronach.

El programador PC/TV está previsto para la generación del chasis MediaPlus (Q 2400 / Q 2500) y las siguientes. Sin embargo no se puede utilizar para las generaciones de chasis más antiguas.

Esta útil ayuda de servicio viene acompañada de un consejo de utilización en detalle, de manera que en este punto no merece detenerse en dar más explicaciones.

El software V2.6 de programación de PC/TV es imprescindible para el chasis Q 2500. La versión V2.6 del software es compatible con versiones anteriores, por lo que también puede utilizarse con el chasis Q 2400. La actualización a la versión V2.6 es posible a través de ISDN-InfoTip y del servidor FTP (véase TK-Info, n° 2001/4). <ftp://ftp.loewe/public/TKService/Software/>

2. Entrada al modo Service

Consulte los pasos para acceder al modo Service en los textos de la figura "Disposición de los comandos del modo SERVICE en el mando a distancia" (pág. 25). Cuando el aparato pasa al modo Service básico, aparece la siguiente sobreimpresión OSD (Menú servicio).

3. Notas para el ajuste geométrico

Los valores de amplitud vertical, posición vertical, linealidad vertical, simetría vertical, amplitud horizontal, fase horizontal, Este/Oeste, trapecioide, etc., se memorizan por separado para las frecuencias de imagen de 50/60 Hz y por ello deben ajustarse individualmente.

Tupo de imagen:	4:3	16:9
- 50Hz	Carta de ajuste:	Carta de ajuste:
- 60Hz	4:3	16:9 und 4:3
	4:3	16:9 und 4:3



Afstemmeingsinstructie

Service mode MediaPlus

30.10.99

1. Functie

In de service-mode kunnen variabele EARAM-waarden afgestemd en kan het toestel via de service-interface door middel van de PC/TV-programmer worden geprogrammeerd. De PC/TV-programmer verbindt een pc via V24 met de service-interface van de TV. Met behulp van de meegeleverde software kan de buitendienstmedewerker moeiteloos in enkele seconden een voor zijn gebied gebruikelijke foutloze standaardprogrammering van het toestel (kanaalnummers, zendernamen bijv. bij kabelnetten) uitvoeren. Ook kunnen hiermee de gegevens van het EARAM worden bewerkt en als bestand op de pc worden opgeslagen.

Let op!

Een software-update voor het Digital/TV - Board (DVB) is **uitsluitend** via de PC/TV-programmer mogelijk!

De PC/TV-programmer (art.nr. 87933-050) is te bestellen bij de Loewe-Klantenservice in Kronach.

De PC/TV-programmer is ontworpen voor chassisgeneraties vanaf MediaPlus (Q 2400 / Q 2500). De programmer is niet geschikt voor oudere chassisgeneraties.

Deze handige servicehulp wordt geleverd met een gedetailleerde gebruiksaanwijzing. Daarom wordt hier in de servicehulp niet verder op ingegaan.

De PC/TV-programmeersoftware V2.6 is voor het chassistype Q 2600 absoluut vereist. Programmaversie V2.6 is compatibel met oudere chassistypes en kan dus ook worden gebruikt voor het bedienen van chassistype Q 2400. Updaten naar V2.6 is mogelijk via ISDN-InfoTip en via de FTP-server - zie TK-info nr. 2001/4. <ftp://ftp.loewe/public/TKService/Software/>

2. Omschakelen op service mode

Hoe u de service mode instelt, wordt beschreven bij de afbeelding: "Rangschikking van de service mode-functie's op de afstandsbediening" (zie pagina 25). Als het toestel zich nu in de basisinstelling van de service mode bevindt, verschijnt de volgende tekst op het beeldscherm (Service menu).

3. Aanwijzingen voor het afstemmen van de geometrie

Verticale amplitude, verticale stand, V-lineariteit, V-symmetrie, horizontale amplitude, H-fase, oost/west, trapezium, enz.

worden afzonderlijk voor 50/60Hz beeldfrequenties opgeslagen en moeten daarom afzonderlijk worden ingesteld:

Beeldbuis:	4:3	16:9
- 50Hz	Testbeeld:	Testbeeld:
- 60Hz	4:3	16:9 und 4:3
	4:3	16:9 und 4:3



4. Abgleichfunktionen (0-12)



4. Alignment functions (0-12)



4. Fonctions d'alignement (0-12)

Abgleichfunktion Alignment functions Fonction d'alignement		Anzeige - Bildschirm z.B. Display - Screen e.g. Affichage écran p.ex.	Einstellwerte / Besonderheiten Settings / special features Valeurs de réglage / Particularités
0	Bild drehen Rotate picture Rotation de l'image	Geometrie Rotation xxx	Bei Geräten mit Rotationsspule kann das Bild gedreht werden. Optionale Einstellung The picture can be rotated in sets with rotation coil. Optimum setting La rotation de l'image est possible sur les appareils équipés d'une bobine de rotation. Réglage optimal
1	V Slope	Geometrie V Slope xxx	Parameter so abgleichen, daß das Video ab der Bildmitte ausgetastet wird. Adjust the parameters so that the video is blanked from the centre of the picture. Equilibrer les paramètres de manière à ce que la vidéo soit supprimée à partir du centre de l'image.
2	Vertikal-Amplitude Vertical Amplitude Amplitude Vertical	Geometrie V Amplitude xxx	Optimale Einstellung Optimum setting Réglage optimal FuBK-Farbtestbild Color test pattern (FuBK) Mire de couleur (FuBK)
3	Vertikal-Lage Vertical Position Position Vertical	Geometrie V Position xxx	
4	Vertikal-Symmetrie Vertical Symmetry Symétrie Vertical	Geometrie S Gornektion xxx	
5	Horizontal-Amplitude Horizontal Amplitude Amplitude Horizontal	Geometrie H Amplitude xxx	Getrennte Einstellungen für die verschiedenen Bildformate (Zoom, Cinema..). Separate settings for different picture formats (zoom, cinema etc...). Réglages séparés pour les différents formats d'image (zoom, cinéma..).
6	Horizontal-Lage Horizontal Position Position Horizontal	Geometrie H Position xxx	
7	OW-Amplitude EW Amplitude Amplitude EO	Geometrie EW Amplit. xxx	Optimale Einstellung Optimum settings Réglage optimal
8	OW oben EW upper En haut EO	Geometrie EW Upper xxx	
9	OW unten EW lower en bas EO	Geometrie EW Lower xxx	
10	Trapez-Korrektur Trapezium Correction Correction Trapéze	Geometrie Trapezium xxx	
11	Vertikal Bogen Vertical Bow Arc Verticale	Geometrie V Bow xxx	
12	Vertikal Winkel Vertical Angle Angle Vertical	Geometrie V Angle xxx	



4. Funzioni d'allineamento (0-12)



4. Funciones de ajuste (0-12)



4. Afstemmingsfuncties (0-12)

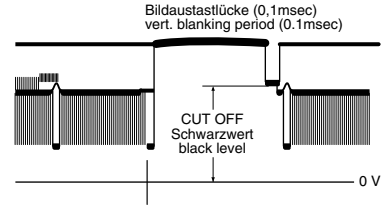
Funzione d'allineamento Funciones de ajuste Afstemmingsfunctie		Indicatore schermo p.es. Indicación - p.ej.: pantalla Weergave - Beeldbuis bijv.	Particolarità della posizionatura / Valori di pos. Valores de ajuste / Observaciones Instelwaarden / Bijzonderheden
0	Girare l'immagine Rotar la imagen Beeld draaien	Geometrie Rotation xxx	Negli apparecchi con bobina di rotazione è possibile girare l'immagine. Regolazione ottimale En los aparatos que dispongan de una bobina rotatoria, se podrá rotar la imagen. Ajuste óptimo Bij toestellen met een rotatiespoel kan het beeld gedraaid worden. Optimale instelling
1	V Slope	Geometrie V Slope xxx	Sintonizzare i parametri in modo tale che il video venga soppresso a partire dal centro dell'immagine. Calibrar los parámetros de manera que el vídeo se muestree a partir del centro de la imagen. Stel de parameters zo in dat de video vanuit het midden van het beeld wordt afgetast.
2	Ampiezza Verticale Amplitud Vertical Verticale Amplitude	Geometrie V Amplitude xxx	Regolazione ottimale Ajuste óptimo Optimale instelling Immagine di prova colore (FuBK) Carta de ajuste en color FuBK Kleurentestbeeld (FuBK)
3	Posizione Verticale Posición Vertical Verticale Stand	Geometrie V Position xxx	
4	Simmetria Verticale Simetría Vertical Verticale Symmetrie	Geometrie S Gorgektion xxx	
5	Ampiezza Orizzontale Amplitud Horizontal Horizontale Amplitude	Geometrie H Amplitude xxx	Impostazioni separate per i diversi formati immagine (zoom, cinema..). Ajustes independientes para los distintos formatos de imagen (Zoom, Cinema, ...) Verschillende instellingen voor de verschillende beeldformaten (zoom, cinema..).
6	Posizione Orizzontale Posición Horizontal Horizontale Stand	Geometrie H Position xxx	
7	Ampiezza EO Amplitud EO OW Amplitude	Geometrie EW Amplit. xxx	
8	Sopra EO Arriba EO OW boven	Geometrie EW Upper xxx	Regolazione ottimale Ajuste óptimo Optimale instelling
9	Giù EO Abajo EO OW onder	Geometrie EW Lower xxx	
10	Correz. Trapezoidale Corrección de Trapezoide Trapezium Correctie	Geometrie Trapezium xxx	
11	Argo Verticale Argo Vertical Verticaal Boog	Geometrie V Bow xxx	
12	Angolo Verticale Angulo Vertical Verticaal Hoek	Geometrie V Angle xxx	



5. Abgleichfunktionen (13-16)



5. Alignment functions (13-16)

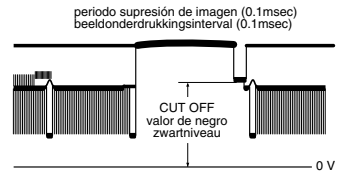
Abgleichfunktion Alignment functions		Anzeige - Bildschirm z.B. Display - Screen e.g.	Einstellwerte / Besonderheiten Settings / special features
13	Horizontal Offset	Geometrie H Offset xxx	Bild auf Mittelposition abgleichen, d. h. der Rand auf beiden Seiten soll gleiche Breite haben. Adjust the picture to the centre position, i.e. the edge should have the same width on both sides.
14a	Cutoff-Meßimpuls Cutoff Measuring Pulse	Cutoff Red xxx Green xxx Blue xxx	An den Farbstufen messen (MP 1,2,3), welche die höchste Spannung zeigt. Mit Ug2-Regler im DST oder Reglerblock einstellen: Cutoff = $148 \pm 2,5V$ DC (für Aconda 93102 Cutoff = $158 \pm 2,5V$) [Vor dieser Einstellung muß Kontrast auf 50, Helligkeit auf 23, Farbsättigung auf 32, Schärfe auf 3 und DNR auf EIN eingestellt werden. Für alle 2 Farben muß Cutoff auf 10 und Weißwert (14) auf 32 stehen! Für 16:9 Geräte muß 16:9 eingeschaltet sein.] Measure the colour output stages (MP 1,2,3) to see which shows the highest tension. With the Ug2 adjuster in DST or adjusting pad, make the following setting: cutoff = $148 \pm 2.5 V$ DC (at Aconda 93102 Cutoff = $158 \pm 2.5V$) [before making this setting, the contrast must be set to 50, brightness to 23, colour saturation to 32, sharpness to 3 and DNR to ON]. For both colours, the cutoff must be 10 and white level (14) must be 32! Regarding 16:9 sets, the 16:9 feature must be activated.] 
14b	Cutoff-Referenzwert Cutoff Reference Value	Cutoff Red xxx Green xxx	In der Graufäche die beiden fehlenden Farben soweit erhöhen, bis Normschwarz erscheint, anschließend mit Taste "OK" abspeichern. Im VGA-Modus ist Abgleich mit VGA-Testbild zu wiederholen. In the grey area rise the missing two colours until black becomes standard, then store these values with "OK" key. Adjustment with VGA test picture must be repeated in VGA mode.
15	Weißwert White Level	White drive Red xxx Green xxx Blue xxx	In der Weißfläche die beiden schwachen Farben soweit erhöhen, bis Normweiß erscheint, jeweils Werte mit Taste "OK" abspeichern. Im VGA-Modus ist Abgleich mit VGA-Testbild zu wiederholen. Increase both faint colours in the white surface until standard white appears and save each setting by pressing "OK". Adjustment with VGA test picture must be repeated in VGA mode.
16	Option bytes	Option byte 0 - 8 Bit 7 6 5 4 3 2 1 0 x x x x x x x x	Achtung! Hier nur Eingaben machen und Speicherung vornehmen a) im notwendigen Reparaturfall b) bei gewünschten Programm-/Normänderung: Abgleichart siehe Option Bytes Tabelle Caution! Here inputs and memorizing: a) in the event of necessary repairs b) if you wish to alter programs/norms For alignment method see Option Bytes Table



5. Funciones de ajuste (13-16)



5. Afstemmingsfuncties (13-16)

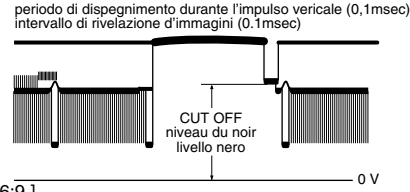
Funciones de ajuste Afstemmingsfunctie		Indicación - p.ej.: pantalla Weergave - Beeldbuis bijv.	Valores de ajuste / Observaciones Instelwaarden / Bijzonderheden
13	Horizontal Offset	Geometrie H Offset xxx	Calibrar la imagen a la posición media; eso significa que el borde tiene que tener el mismo ancho a ambos lados. Regel het beeld zo af dat het zich in het midden bevindt, d.w.z. de randen aan weerszijden moeten even breed zijn.
14a	Impulso de medición Cutoff Cutoff-Meetimpuls	Cutoff Red xxx Green xxx Blue xxx	Medir en los pasos finales de color (MP 1,2,3) cuál es el que muestra la mayor tensión. Ajustar con el regulador Ug2 en DST o bloque regulador: Cutoff = $148 \pm 2,5$ V DC (Aconda 93102 Cutoff=$158 \pm 2,5$V) [Antes de realizar este ajuste se tiene que ajustar el contraste en 50, el brillo en 23, la saturación de color en 32, la claridad en 3 y DNR en Sí. ¡Cada dos colores el Cutoff tiene que estar en 10 y el valor de blanco (14) en 32! Para aparatos 16:9 tiene que estar conmutado 16:9.] Meet welke kleureneindtrap (MP 1, 2, 3) de hoogste spanning heeft. Stel met de Ug2-regelaar in de DST of het controllerblok in: cutoff = $148 \pm 2,5$ V DC (Aconda 93102 Cutoff=$158 \pm 2,5$V) [hiervoor moet het contrast worden ingesteld op 50, de helderheid op 23, de kleurverzadiging op 32, de scherppte op 3 en DNR op AAN. Voor beide kleuren moet cutoff op 10 en de witwaarde (14) op 32 staan! Voor 16:9-toestellen moet 16:9 ingeschakeld zijn.] 
14b	Valor de referencia Cutoff Cutoff-Referentiewaarde	Cutoff Red xxx Green xxx	En el área gris, incrementar los dos colores faltantes hasta que aparezca el nero normalizado. A continuación, memorizar con el botón "OK". En el modo VGA deberá repetirse el ajuste con la imagen de prueba VGA. Verhoog de twee ontbrekende kleuren in het grijze vlak tot normzwart verschijnt. Sla de instelling vervolgens met de toets "OK" op. In de VGA-modus moet het beeld met behulp van het VGA-testbeeld opnieuw worden afgesteld.
15	Valor de blanco Witniveau	White drive Red xxx Green xxx Blue xxx	Aumentar en la superficie blanca los dos colores débiles hasta que aparezca el blanco normalizado, grabar respectivamente los colores con la tecla „OK“. En el modo VGA deberá repetirse el ajuste con la imagen de prueba VGA. Versterk de beide zwakke kleuren in het witte vlak zodanig, dat er normwit verschijnt. Sla de betreffende waarden met de toets „OK“ op. In de VGA-modus moet het beeld met behulp van het VGA-testbeeld opnieuw worden afgesteld.
16	Option bytes	Option byte 0 - 8 Bit 7 6 5 4 3 2 1 0 x x x x x x x x	Atención! Aquí sólo deben introducirse datos y realizar memorizaciones: a) en caso de necesitar una reparación b) para cambiar los datos de programación o la norma Para el tipo de ajuste, véase la tabla de bytes de opción Let op! Hier mogen alleen gegevens worden ingevoerd en opgeslagen a) bij een noodzakelijke reparatie b) bij een gewenste programma-/normwijziging: Afstemmingswijze zie Option Bytes-tabel



5. Fonctions d'alignement (13-16)



5. Funzioni d'allineamento (13-16)

Fonctions d'alignement Funzioni d'allineamento		Affichage écran p.ex. Indicatore schermo p.es.	Valeurs de réglage / Particularités Particolarità della posizionatura / Valori di pos.
13	Horizontal Offset	Geometrie H Offset xxx	Equilibrer l'image en position centrale, c.-à-d. que la bordure doit avoir la même largeur des deux côtés. Bilanciare l'immagine sulla posizione centrale, vale a dire che il bordo deve avere su entrambi i lati la stessa larghezza.
14a	Impulsion de mesure Cutoff Impulso di misura Cutoff	Cutoff Red xxx Green xxx Blue xxx	Mesurer aux étages de sortie de couleur (MP 1,2,3) lequel montre la tension la plus élevée. Avec le régulateur Ug2 dans le DST ou le bloc régulateur, régler: cutoff = $148 \pm 2,5V$ CC (Aconda 93102 Cutoff = $158 \pm 2,5V$) [Avant ce réglage, le contraste doit être réglé sur 50, la luminosité sur 23, la saturation des couleurs sur 32, la netteté sur 3 et le DNR sur EIN (MARCHE). Pour les 2 couleurs, le cutoff doit être sur 10 et la valeur de blanc (14) sur 32 ! Pour les appareils 16:9, 16:9 doit être activé.] Misurare con gli stadi di uscita del colore (MP 1,2,3), quale di essi presenta la tensione più elevata. Regolare con il regolatore Ug2 nel DST o con il blocco di regolazione: Cutoff = $148 \pm 2,5V$ DC (Aconda 93102 Cutoff = $158 \pm 2,5V$) [Prima di questa impostazione il contrasto va impostato su 50, la luminosità su 23, la saturazione cromatica su 32, la nitidezza su 3 e il DNR su ON. Per tutti i 2 colori il Cutoff deve essere posto su 10 e il livello del bianco (14) su 32! Per apparecchi 16:9 bisogna attivare il 16:9.] 
14b	Valeur de référence Cutoff Valore di riferimento Cutoff	Cutoff Red xxx Green xxx	Dans la surface grise, augmenter les deux couleurs faibles jusqu'à ce que le noir normal apparaisse, puis mémoriser avec la touche "OK". En mode VGA, il faut procéder une nouvelle fois au réglage sur la mire VGA. Nella superficie grigia, aumentare i due colori più deboli fino a far apparire il nero di norma. Poi memorizzare con il tasto "OK". In modalità VGA va ripetuta la regolazione con immagine di prova VGA.
15	Valeur du blanc Livello bianco	White drive Red xxx Green xxx Blue xxx	Dans la surface des blancs, augmenter les deux couleurs faibles jusqu'à ce que le blanc normalisé apparaisse; enregistrer les valeurs respectives avec la touche "OK". En mode VGA, il faut procéder une nouvelle fois au réglage sur la mire VGA. Aumentare nella superficie del bianco i due colori deboli finché non compare bianco standard, e memorizzare i valori premendo sempre il tasto "OK". In modalità VGA va ripetuta la regolazione con immagine di prova VGA.
16	Option bytes	Option byte 0 - 8 Bit 7 6 5 4 3 2 1 0 x x x x x x x x	Attention! Ne faire ici que des entrées et procéder à la mémorisation: a) dans le cas où réparation est nécessaire b) dans le cas d'une modification de programme/norme souhaitée Genre d'alignement, voir tableau des bytes d'option Attenzione Qui effettuare solo ingressi e memorizzazioni:! a) in caso di necessita di riparazione b) per modifiche di programma/norma Per il tipo di sintonia vedi l'opzione tabella bytes



6. Abgleichfunktionen (17-29)



6. Alignment functions (17-29)

Abgleichfunktion Alignment functions		Anzeige - Bildschirm z.B. Display - Screen e.g.	Einstellwerte / Besonderheiten Settings / special features
17	Farbhilfsträger-Osz. Subcarrier Osc.	Colour VCO: main stop start	Autom. Abgleich Autom. adjustment
18	Farbhilfsträger-Osz. Subcarrier Osc.	Colour VCO: PiP stop start	Autom. Abgleich Autom. adjustment
19	Vertikal-Lage PiP Vertikal Pos. PiP	PiP position General V xxx	Optimale Einstellung im Hauptbild. Optimum setting in the main picture.
20	Horizontal-Lage PiP Horizontal Pos. PiP	PiP position General H xxx	
21	Vertikal-Lage PiP Vertikal Pos. PiP	PiP position Stationtable V xxx	Optimale Einstellung in der Programmübersicht. Optimum setting in the channel overview.
22	Horizontal-Lage PiP Horizontal Pos. PiP	PiP position Stationtable H xxx	
23	Y-Verzögerung Y Delay	Other adjustments Y delay xxx	Optimale Einstellung (getrennt für PAL, NTSC, SECAM) Optimum setting (separate adjustments for PAL, NTSC, SECAM)
24	Helligkeits-Offset Brightness Offset	Other adjustments Subbrightness xxx	Keine Einstellung vornehmen! Don't adjust!
25	Kontrast-Steilheit Subcontrast	Other adjustments Subcontrast xxx	Mit Gittertestbild bei maximalem Kontrast, Subkontrast so einstellen, daß weiße Linien nicht übersteuern. With the screen test image in maximum contrast, adjust the subcontrast, so that the white lines are not overridden.
26	Kontrastfaktor Contrastfactor	Other adjustments Contrastfactor Y xxx	Keine Einstellungen vornehmen - Wert = 75 No setting exists – value = 75.
27	Vertikal-Lage VT Vertikal Pos. TT	Other adjustments Text Position V xxx	Optimale Einstellung Optimum settings
28	Horizontal-Lage VT Horizontal Pos. TT	Other adjustments Text Position H xxx	
29	RC-Subsystem	Other adjustments RC-Subsystem xxx	Zusätzliche RC 5-Ebene kann zugelassen werden. Additional RC 5 levels are permitted.



6. Fonctions d'alignement (17-29)



6. Funzioni d'allineamento (17-29)

Fonctions d'alignement Funzioni d'allineamento		Affichage écran p.ex. Indicatore schermo p.es.	Valeurs de réglage / Particularités Particolarità della posizionatura / Valori di pos.
17	Sous-porteuse Couleur Osc. del sottoport. colore	Colour VCO: main stop start	Alignement autom. Allineamento autom.
18	Sous-porteuse Couleur Osc. del sottoport. colore	Colour VCO: PiP stop start	Alignement autom. Allineamento autom.
19	Position Vertical PiP Posizione Verticale PiP	Other adjustments PiP Position V xxx	Réglage optimal sur l'image principale. Impostazione ottimale nell'immagine principale.
20	Position Horizontale PiP Posizione Orizz. PiP	Other adjustments PiP Position H xxx	
21	Position Vertical PiP Posizione Verticale PiP	Other adjustments PiP Position V xxx	Réglage optimale dans l'aperçu des chaînes. Impostazione ottimale nel sommario dei programmi.
22	Position Horizontale PiP Posizione Orizz. PiP	Other adjustments PiP Position H xxx	
23	Retard Y Ritardo Y	Other adjustments Y delay xxx	Réglage optimal (réglage séparément pour PAL, NTSC, SECAM) Regolazione ottimale (regolazioni separati per PAL, NTSC, SECAM)
24	Offset luminosité Offset luminosità	Other adjustments Subbrightness xxx	N'effectuez pas de réglage! Non eseguire alcuna impostazione!
25	Sub contraste Sub contrasto	Other adjustments Subcontrast xxx	Avec la grille de test et à contraste maximum, régler le sous-contraste de manière à ce que les lignes blanches ne soient pas surmodulées. Con l'immagine di prova a griglia e contrasto massimo impostare il subcontrasto in maniera tale che le linee bianche non subiscano una distorsione.
26	OSD contraste OSD contrasto	Other adjustments OSD Contrast xxx	
27	Position Vertical TT Posizione Verticale TV	Other adjustments Text Position V xxx	Réglage optimal Regolazione ottimale
28	Position Horizontal TT Posizione Orizz. TV	Other adjustments Text Position H xxx	
29	RC-Subsystem	Other adjustments RC-Subsystem xxx	Un niveau RC 5 supplémentaire est acceptable. Può essere ammesso un livello RC 5 supplementare.



6. Funciones de ajuste (17-29)



6. Afstemmingsfuncties (17-29)

Funciones de ajuste Afstemmingsfunctie		Indicación - p.ej.: pantalla Beeldschermaanduiding bijv.	Valores de ajuste / Observaciones Instelwaarden / Bijzonderheden
17	Oscilador de la subportadora de color Kleurdraaggolf-Osc.	Colour VCO: main stop start	Comprobación automática Autom. afstemming
18	Oscilador de la subportadora de color Kleurdraaggolf-Osc.	Colour VCO: PiP stop start	Comprobación automática Autom. afstemming
19	Posición Vertical PiP Verticale Stand PiP	Other adjustments PiP Position V xxx	Ajuste óptimo en la imagen principal. Optimale instelling in het hoofdbeeld.
20	Posición Horizontal PiP Horizontale Stand PiP	Other adjustments PiP Position H xxx	
21	Posición Vertical PiP Verticale Stand PiP	Other adjustments PiP Position V xxx	Ajuste óptimo en el resumen de programas. Optimale instelling in het zenderoverzicht.
22	Posición Horizontal PiP Horizontale Stand PiP	Other adjustments PiP Position H xxx	
23	Retardo Y Y-Vertraging	Other adjustments Y delay xxx	Ajuste óptimo (por separado para PAL, NTSC, SECAM) Optimale instelling (gescheiden voor PAL, NTSC, SECAM)
24	Offset de brillo Helderheids-Offset	Other adjustments Subbrightness xxx	No realizar ningún ajuste! Geen instelling uitvoeren!
25	Sub contraste Contrast-Steilheid	Other adjustments Subcontrast xxx	Con la imagen de ajuste de cuadrículas en contraste máximo se ajustará el subcontraste de manera que las líneas blancas no se sobremodulen. Stel met het rastertestbeeld op maximaal contrast het subcontrast zo in dat witte lijnen niet overstuurd worden.
26	OSD Contraste OSD-Contrast	Other adjustments OSD Contrast xxx	
27	Posición Vertical TT Verticale Stand TT	Other adjustments Text Position V xxx	Ajuste óptimo Optimale instelling
28	Posición Horizontal TT Horizontale Stand TT	Other adjustments Text Position H xxx	
29	RC-Subsystem	Other adjustments RC-Subsystem xxx	El nivel suplementario RC 5 se puede autorizar. Aanvullend RC 5-niveau is toelaatbaar.



1 - 32



1 - 33

Option Byte-Tabelle • Option Byte Table • Tableau Option Byte • Tabella Byte delle Opzioni • Tabla de bytes de opciones • Option Bytes tabel

Abgleichfunktion Alignement function Fonction d'alignement Funzione di comp Función de ajuste. Afstemmingsfuncties	Bit-Nr. No. N°. No. No. Nr.	Bedeutung Meaning Signification Significato Significación Betekenis	"0"	"1"	
Byte 0	0	Terrestrischer Tuner	BGDK	Multistandard	
	1	EPG Programmfiler EPG Programme filter	ein on	aus off	
	2	ZAP ² TEXT	nein no	ja yes	
	3	Rotation-Modul Rotations Modul	nein no	ja yes	
	4	LOEWE SYSTEMS-Gerät LOEWE SYSTEMS TV set	nein no	ja yes	
	5	Blaubild ohne Signal Blue picture w/o signal	ja yes	nein no	
	6	VGA	nein no	ja yes	
	7	TVA	nein no	ja (nur wenn OPT5/4=1) yes (only if OPT5/4=1)	
Byte 1	0	Zeitgest. Progr. Umschaltung Timing program change	ja yes	nein no	
	1	Sync Slicer VPC	wird nicht beschrieben not described	wird beschrieben is described	
	2	WSS-Auswertung im VCR-Mode WSS Detection in VCR mode	nein no	ja yes	
	3	VPC SynchSlicer Pegel im TV-Mode VPC SynchSlicer level in TV mode	TV-Pegel TV level	VCR-Pegel VCR level	
	4	HMM-Sofort Start (Bank) HMM immediately start	nein no	ja yes	
	5	OEM Gerät OEM TV set	nein no	ja yes	
	6	Film-Mode bei TV/DVB Film mode with TV/DVB	gesperrt disabled	zugelassen permitted	
	7	Bei VGA Synch-Ausfall at VGA mode synch cancellation	Umschaltung in TV-Mode switching to TV mode	VGA-Mode beibehalten keep VGA mode	
Byte 2	0	FLOF	ein on	aus off	
	1	EPG Erstes Einschalten EPG First use	nein no	ja yes	
	2	Blockier Mode VPC Lock Mode VPC	nein no	ja yes	
	3	Dunkeltastung beim Umschalten Blanking by switch-over	nein no	ja yes	
	4	Lautstärkepegel MSP-Ausgang Volume level MSP-output	normal normal	+9dB (HW-Änderung BB) +9dB (HW modification BB)	
	5	AGC memory	aus off	ein on	
	6	Reaktionszeit auf FB-Befehle Reaction time of remote orders	schnell fast	langsam slow	
	7	WSS (Wide Screen Signalling Bits)	ausgewertet evaluated	nicht ausgewertet not evaluated	

Option Byte-Tabelle • Option Byte Table • Tableau Option Byte • Tabella Byte delle Opzioni • Tabla de bytes de opciones • Option Bytes tabel

Abgleichfunktion Alignement function Fonction d'alignement Funzione di comp Función de ajuste. Afstemmingsfuncties	Bit-Nr. No. N°. No. No. Nr.	Bedeutung Meaning Signification Significato Significación Betekenis	"0"	"1"	
Byte 3	0	Formateinstellung Format setting	Standardwerte freigegeben standard values free	Standardwerte gesperrt standard values blocked	
	1	Bildröhrenformat Picture tube format	4:3	16:9	
	2	EPG(analog) Nacht-Aktualisierung EPG (analogue) night update switch on delay	aus off	ein on	
	3	frei free	----	----	
	4	Abschalten nach Programmschluß Switching off after channel closes	ja yes	nein no	
	5	Fabrikmodus / Tandberg-Monitor Factory Mode / Tandberg-Monitor	aus off	ein oder Tandberg-Monitor on or Tandberg-Monitor	
	6	PIP-Hintergrundfarbe im VGA-Mode PIP background	schwarz black	PIP-Rahmenfarbe PIP frame colour	
	7	Menü "erstes Einschalten" "First use" Menu	nein no	ja yes	
Byte 4	0	Einschaltverzögerung switch on delay	nein no	1s nach Regelung ein 1h after adjustment	
	1	Autom. Lautstärke Regelung (AVC) Automatic Volume Control (AVC)	langsam slow	schnell fast	
	2	Abschaltvorhang Power down cycle	ja yes	nein no	
	3	Dunkeltastung Umschalten DVB Blanking switching to DVB	nein no	ja yes	
	4	Autom. Filmkennung (AMD) AMD switch-over (AMD)	schnell fast	langsam slow	
	5	Warmlaufmodus / Tandberg-Monitor Warm-up mode / Tandberg-Monitor	ein oder Tandberg-Monitor on or Tandberg-Monitor	aus off	
	6	Movie Fall Back Mode (BESIC)	aus off	ein on	
	7	Standbild im VCR Mode "Pause" Freeze frame in VCR mode "Pause"	ja yes	nein no	
Byte 5	0	SUB 27 Befehle SUB 27 orders	ausgewertet evaluated	ignoriert ignored	
	1	Seitenumblättern bei EPG (analog) Turning pages with EPG (analogue)	Cursor springt nach unten Cursor jumps to bottom	Cursor springt nach oben Cursor jumps to top	
	2	50 Hz Progressiv-Darstellung 50 Hz progressive prepresentation	aus off	ein on	
	3	60 Hz Progressiv-Darstellung 60 Hz progressive prepresentation	aus off	ein on	
	4	HMM-Mode	nein no	ja yes	
	5	EPG Test-Mode EPG test mode	aus off	ein on	
	6	HMM-Tastatur HMM keyboard	alt old	neu new	
	7	Idle-Mode in Stand By (ab M2 B11)	nein no	ja yes	

Option Byte-Tabelle • Option Byte Table • Tableau Option Byte • Tabella Byte delle Opzioni • Tabla de bytes de opciones • Option Bytes tabel

Abgleichfunktion Alignement function Fonction d'alignement Funzione di comp. Función de ajuste. Afstemmingsfuncties	Bit-Nr. No. N°. No. No. Nr.	Bedeutung Meaning Signification Significato Significación Betekenis	"0"	"1"	
Byte 6	0	HDLC	time out	no time out	
	1	Klemmverst. RGB-Eingang VPC blank amplifier RGB input VPC	ACh	A0h	
	2	Funktion an Port 2.14 (M2 Pin 11) Function at port 2.14 (M2 pin 11)	Tastensperre für TVO Key lock for TVO	Entmagnetisierung Demagnetisation	
	3	EPG RAM Test	ja yes	nein no	
	4	VT Timeout nach 10 Minuten VT timeout after 10 minutes	ja yes	nein no	
	5	automat. Einschalten im VT-Modus Automatic switch on in VT mode	nein no	ja yes	
	6	Indikation des Film-Modes Indication of film mode	nein no	durch Farbe des Side-Panels by color of the side panel	
	7	VT-Unterseiten Modus "VT subpages mode"	normal normal	aus out	
Byte 7	0	BESIC Version	<V5.2	>V5.2	
	1	Ton für HMM-Geräte sound for HMM equipment	VGA-Ton intern VGA sound internal	VGA-Ton extern VGA sound external	
	2	Suchlauf Search	normal normal	Test Mode (Feinsuchlauf) test mode (fine search)	
	3	Bevorzugter Tuner (DVB bestückt) preferred tuner (with DVB)	zus. SAT-Tuner (normal) additional SAT tuner (normal)	Haupt-SAT-Tuner (evtl. für Italien) main SAT tuner (possibly for Italy)	
	4	Auswertung der 16:9-Schaltspannung Assessing the 16:9 switching voltage	ja yes	nein no	
	5	Bevorzugter Tuner (ohne DVB) preferred tuner (without DVB)	Haupt-SAT-Tuner (normal) main SAT tuner (normal)	zus. SAT-Tuner (keine Tonsstörungen) additional SAT tuner (no sound impairment)	
	6	AV2-Monitor für C-Box AV2 monitor for C-Box	gesperrt blocked	freigegeben enabled	
	7	ext. HF-Sender für Ton ext. HF transmitter for sound	ja yes	nein no	
Byte 8	0	Fabrikmodus Factory Mode	nein no	ja yes	
	1	Klinkenstecker Audio-in Jack plug Audio In	nicht bestückt without	bestückt with	
	2	Frontbuchse Front socket	bestückt with	nicht bestückt without	
	3	Dynam. Bass (MICRONAS)	aus out	ein on	
	4	75 Hz Interlace-Darstellung 75 Hz interface representation	aus out	ein on	
	5	Blue Stretch	aus out	ein on	
	6	Black Stretch	aus out	ein on	
	7	Auto. Wiedereinschalten (Warm Up) Auto on (warm up)	aus out	ein on	

TV-Menü 1 (MediaPlus)

Persönliche Werte abrufen
Werkswerte abrufen
Als persönliche Werte speichern

Kontrast 50
Bildanpassung normal
Farbe 32
Helligkeit 23
Schärfe 3
Farbton 0
Farbformat 4:3
DNC ein
DMI ein
AMD aus
Bild drehen 0
Bild vert. 0

Ton über TV HiFi
Tonanpassung nein
Kopfh.-Lautstärke 42
Ton Lautsprecher Stereo
Ton Kopfhörer Stereo
AV-Ausgangston Ton 1+2
Lautstärkeautom. ein
Max. Lautstärke 63
Basisverbreiterung ein
Höhen 2
Tiefen 6
Balance 0

Normalwerte
Bild
Ton
Einstellungen

Automatisch suchen
Manuell einstellen
Sortieren
Programmbereich löschen
Name eingeben/ändern
Decoder-Programme
Vorzugsprogramme

Einmalig ausschalten ja, um 00:00
Täglich ausschalten ja, um 00:00
Einmalig erinnern ja, um 00:00
Täglich erinnern ja, um 00:00
Lautstärke Erinnerung 30

AV-Geräte anschließen
Decoder-Programme
AV-Norm manuell einstellen
Audio Digital (nur bei AC3)
Für TV-Programme

Bitte geben Sie Ihre persönliche Geheimnummer ein
Kindersicherung ????

Einblenddauer 7
Einblendposition unten oben
Programmtitel ja
Tonkennung ja
Uhrzeit ja
Weckzeit nein
Ausschaltzeit nein

Persönliche Teletext-Seiten
Bildformat
Letztes Programm
Programm Info
Vorzugsprogramme
Uhrzeit
Teletext-Untertitel
Programme anspielen
Bild vert. verschieben
Kontrast
Farbe
Helligkeit
Timeraufnahme von Hand
Zeitdienste
Standbild

Uhrzeit **: **: :
Abweichung von Weltzeit +01 Stunde(n)
Datum **: **: :
Beginn Sommerzeit 26.03.
Ende Sommerzeit 29.10.

Sprache D
Language GB
Langue F
Lingua I
Idioma E
Taal NL
Sprog DK
Språk S
Jazyk CZ
Jezyk PL
Γλώσσα GR
Язык RS
Idioma P
Nyelv HU
Jezik SLN
Lisan TR

Ihr Fernseher führt die Suche mit folgenden Einstellungen durch:
Gerätestandort Deutschland
Programmquelle Antenne/Kabel
Suchumfang Alle Programme
Norm PAL-BG
Programme speichern ab Programmplatz 1

Suche durchführen
Einstellungen ändern

Bereich VHF UHF Kabel
Kanal E01 (E01 ... E12)
Frequenz 196.18 MHz (037.75-859.25 MHz)
Name ARD (A...Z + - 0...9)
Norm ... Autom.-DK PAL-BG PAL-I ...

Suchlauf
Speichern

195 VGA
196 AV S
197 AV 3
198 AV 2
199 AV 1
0 VIDEO
1 ARD
2 ZDF
3 SAT. 1
4 RTL
5 VOX
6 S-RTL
7 N-TV
8 DSF
9 TM3
10 PRO7
11 RTL2
12 WDR3
13 BR
14 HR
15 N3
16 MDR3
17 KIKA
18 PHOENIX
19 BR-ALPHA
20 3SAT
21 EUROSPRT
22 KABEL 1
23 PREMIERE
24 MTV
25 CNN INT.
26 HOT
27 TIDO

Programm verschieben
Leerprogramm einfügen
Programm löschen
Info
Zurück
Ende

Bitte schließen Sie Ihre Videogeräte wie dargestellt an.

AV 1 AV 2 AV 3
VCR 1+2: Digital Link Plus
DVD
DEC.2
SAT
VCR2
STB
VCR1
Dec.1
AVS

Mit OK andere Geräte anschließen

An AV1
An AV2
An AV3
An AVS

Eingangssignal mit AV1 mit AV2 mit AV3 mit AVS separat

AV-Schaltspannung zulassen nein ja
RGB Einblendungen nein ja

Für alle Programme
Für einzelne Programme
Geheimnummer ändern 1234
Geheimnummer löschen nein ja

Programme werden gesucht, bitte warten !

Bitte geben Sie Ihren Gerätestandort an, damit die gefundenen Programme Landesüblich sortiert werden können.
A, B, CH, D, DK, E, G, GB, I, NL, S, Anderes Land

Bitte geben Sie die Programmquelle an, die Ihre Programme liefern soll:
Antenne/Kabel
Astra (nur bei SAT)

Bitte geben Sie den Umgang der zu suchenden Programme an:
Signaltyp analog digital
Vorzugsprogramm nutzen nein ja
Schnellsuche nein ja

Bitte geben Sie den Umgang der zu suchenden Programme an:
Alle Programme
Nur neue Programme

Bitte wählen Sie die Norm aus:
Autom. - BG Autom. - I Autom. - L Autom. - DK
PAL-BG PAL-I PAL-L PAL-DK
SECAM-BG SECAM-L SECAM-DK NTSC
NTSC-V PAL60 PAL-M PAL-N

Wählen Sie den Programmplatz, ab dem die Programme gespeichert werden sollen:
(0 bis 195 möglich [bei DVS integriert 0 bis 799])

Videorecorder nein 1 Standard
DVD nein ja
Sat Receiver nein ja
Set TopBox nein ja
Decoder nein 1 2 1 an SAT
Camcorder nein
Anderes Gerät an AV1 nein ja
Anderes Gerät an AV2 nein ja
Anderes Gerät an AV3 nein ja
Anderes Gerät an AVS nein ja

Autom. - VHS/SVHS
VHS/8mm
SVHS/Hi8
Autom. - FBAS/YC
FBAS
YC
Audio

Automatisch
PAL
SECAM
NTSC
NTSC-V
PAL60
PAL-M
PAL-N

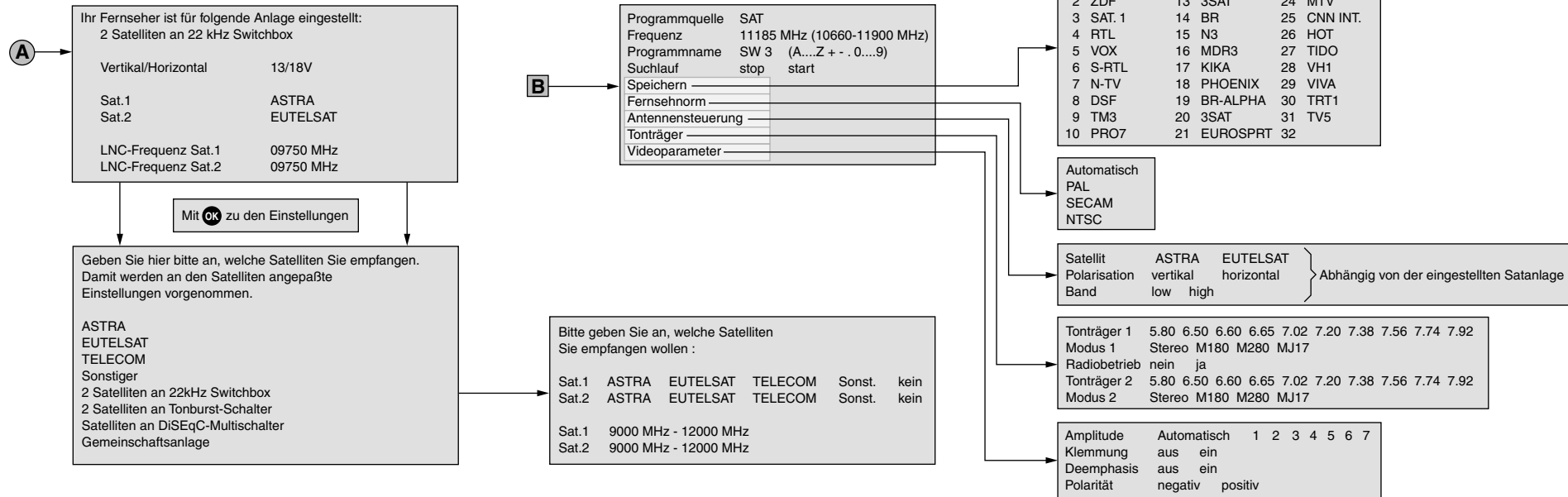
Ab jetzt sperren nein ja
Täglich sperren nein ja von 00:00 bis 00:00
Einmalig sperren nein ja von 00:00 bis 00:00

OK
Info
Zurück
Ende

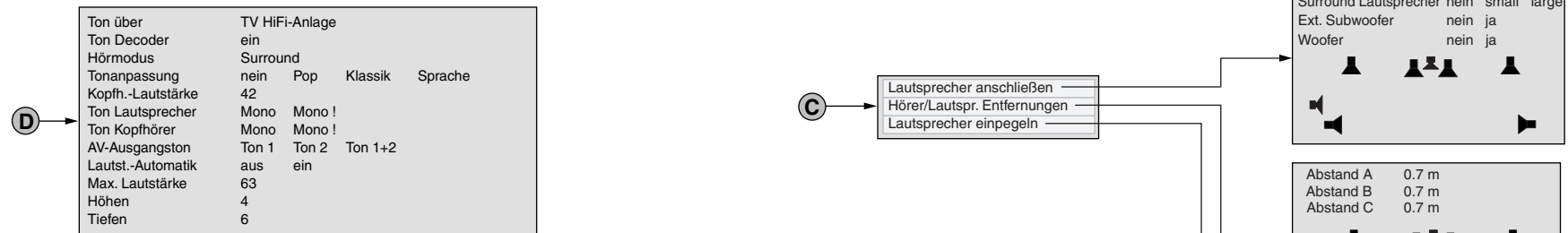
A, B, C, D und E siehe TV-Menü 2

Sollte der Menüpunkt „Einstellungen“ im TV-Menü, das TT-Menü, das PIP-Menü und die Menüpunkte „Überspielen“ und „Anschlüsse“ im Video-Menü und die Einstellmöglichkeiten im EPG-Menü nicht mehr vorhanden sein, so ist zu beachten, daß diese in der „Hauptinformation“ im Unterpunkt „Wahl des Bedienungsfanges“ (Vereinfachte Bedienung ja) ausgeschaltet werden können.

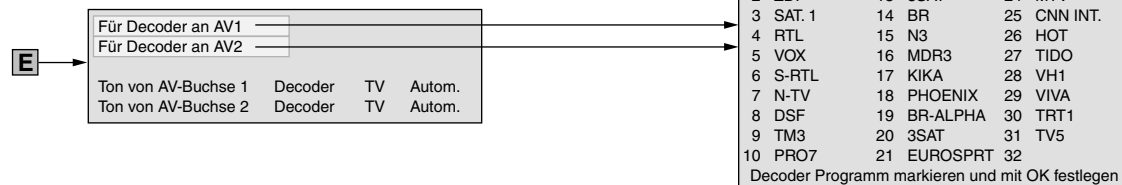
Änderungen des Menüs bei eingebautem SAT VI



Änderungen des Menüs bei eingeschaltetem Dolby Decoder



Änderungen des Menüs bei angeschlossenem Decoder



ⓓ TV-Menü 3 (MediaPlus)

Video Bedienung über TV-Menü → V=

VID. 3						STOP
VID. 2		AUX				STOP
VID. 1		AUX				STOP

M Video-Menü
E Ende

Video-Menü

Timeraufnahme _____

Timer ändern _____

Timer löschen _____

Anschlüsse _____

Digital Link Plus Übertragung _____

Für Recorder AV1 AV2

über nexTVView/EPG _____

über Teotext (VPS) _____

Von Hand _____

0 VIDEO	11 RTL2	22 KABEL 1
1 ARD	12 WDR3	23 PREMIERE
2 ZDF	13 3SAT	24 MTV
3 SAT. 1	14 BR	25 CNN INT.
4 RTL	15 N3	26 HOT
5 VOX	16 MDR3	27 TIDO
6 S-RTL	17 KIKI	28 VH1
7 N-TV	18 PHOENIX	29 VIVA
8 DSF	19 BR-ALPHA	30 TRT1
9 TM3	20 3SAT	31 TV5
10 PRO7	21 EUROSPT	32

Über den Videotext des jeweiligen Senders das Programm auswählen, das aufgezeichnet werden soll. Die Daten der Sendung werden automatisch als Timer-Daten übernommen.

Recorder	VID.1	VID.2
Programm	001	ARD
VPS	ja	
Datum	** . **	
Aufnahmezeit	** : ** bis ** : **	

Progr. Uhrzeit Datum VPS Rec.

AV-Geräte anschließen

Decoder-Programme

AV-Norm manuell einstellen

Audio Digital

Für TV-Programme

Übertragung der Programmliste an den (die) Digital Link Plus-Recorder

Übertragung start stop übertragen (pro Recorder) 0 %

Bitte schließen Sie Ihre Videogeräte wie dargestellt an.

VCR 1+2: Digital Link Plus

AV1 AV2 AV3

DVD

DEC.2 SAT

VCR2 STB

VCR1 Dec.1

AVS

Mit **OK** andere Geräte anschließen

Videorecorder

DVD

Sat Receiver

Set TopBox

Decoder

Camcorder

Anderes Gerät an AV1

Anderes Gerät an AV2

Anderes Gerät an AV3

Anderes Gerät an AVS

Autom. - VHS/SVHS

VHS/8mm

SVHS/Hi8

Autom. - FBAS/YC

FBAS

YC

Audio

Automatisch

PAL

SECAM

NTSC

NTSC-V

PAL60

PAL-M

PAL-N

An AV1

An AV2

An AV3

An AVS

Eingangssignal mit AV1 mit AV2 mit AV3 mit AVS separat

AV-Schaltspannung zulassen

RGB Einblendungen

Info

M Zurück

E Ende

F siehe TV-Menü 4

nextView Menü: (Taste nexTVView bzw. EPG auf der Fernbedienung)

Fr. 08.10. jetzt demnächst 17:30 18:00 18:30...

16:10	BR	Flucht in die Dolomiten	-17:30
16:50	VOX	Ein ganz normaler Heiliger (13)	
17:00	RTL2	Der Hotelboy (17)	
17:00	RTL	Hans Meiser	

Heimatabenteuer - BRD - 1955
- Regie: Luis Trenker * Wieder mal ruft der Berg: Luis Trenker unter Mordverdacht

Auswählen und mit OK ansehen
 Aufnahme
 Tag
 Themen
 Programmvorschau
 Menü
 Ende

M

Übersicht der vorgemerkten Programme

Programmauswahl

Sender

Bei Vormerkung TV einschalten nein ja

Vorgemerktes Programm melden ansehen

Datenerfassung aus ein

Kuzinfo-Zeilen keine 3 4 5 6

Themeneinstieg aktuelles Thema alle Themen

08.10.	19:00	ZDF	Schloßhotel Orth
09.10.	19:00	BR	Rundschau
10.10.	04:40	ZDF	Länderspiegel
10.10.	05:00	RTL	Beverly Hills, 90210
10.10.	19:15	VOX	Vox tours - Das Reisemaga
11.10.	04:40	ARD	Presseclub

Auswählen und mit OK löschen
 Zurück
 Ende

0 VIDEO	11 RTL2	22 KABEL 1
1 ARD	12 WDR3	23 PREMIERE
2 ZDF	13 3SAT	24 MTV
3 SAT.1	14 BR	25 CNN INT.
4 RTL	15 N3	26 HOT
5 VOX	16 MDR3	27 TIDO
6 S-RTL	17 KIKA	28 VH1
7 N-TV	18 PHOENIX	29 VIVA
8 DSF	19 BR-ALPHA	30 TRT1
9 TM3	20 3SAT	31 TV5
10 PRO7	21 EUROSPRT	32

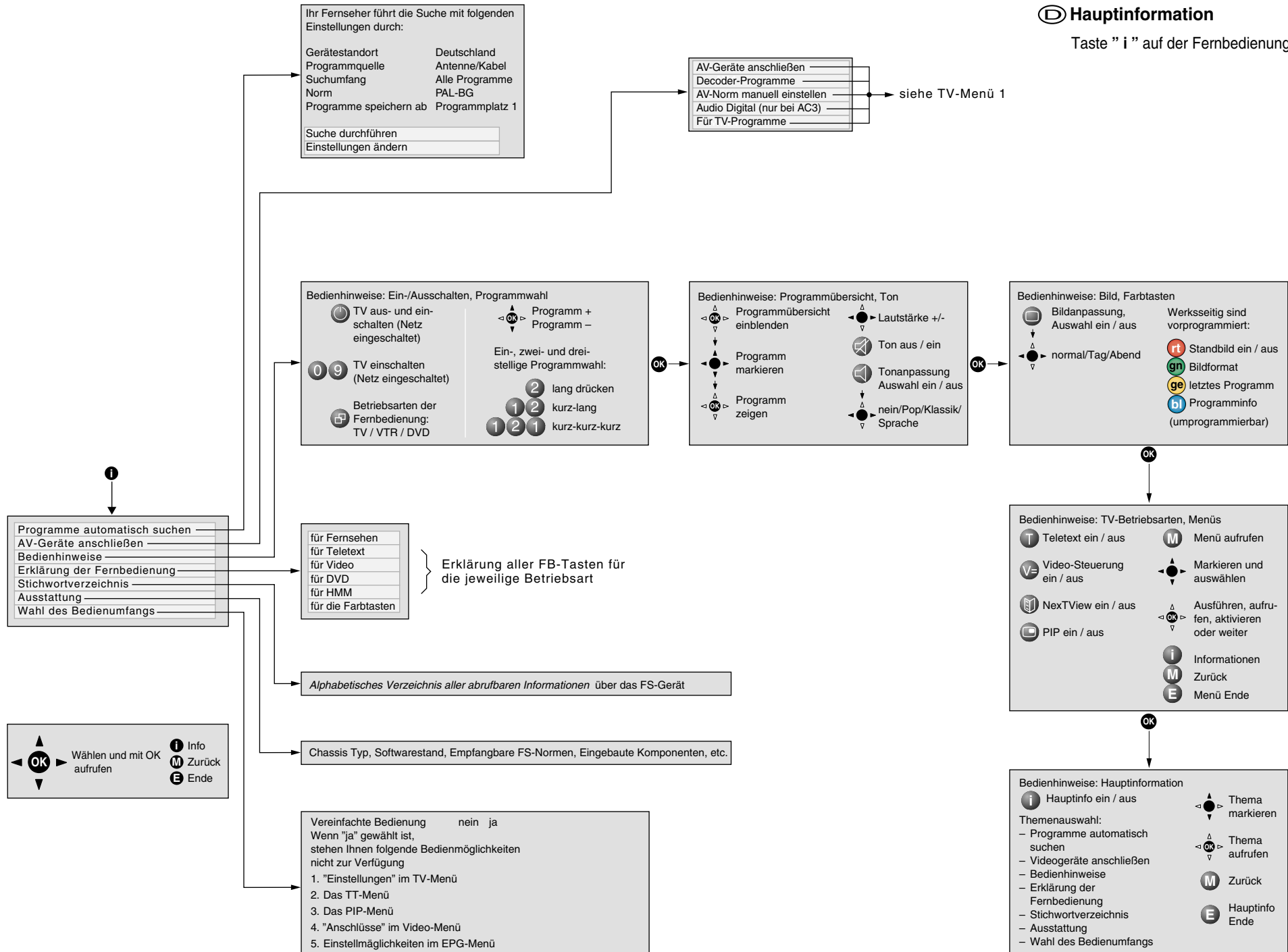
Auswählen und mit OK markieren
 markieren
 Alle markieren
 Keine markieren
 Info
 Zurück
 Ende

0 VIDEO	11 RTL2	22 KABEL 1
1 ARD	12 WDR3	23 PREMIERE
2 ZDF	13 3SAT	24 MTV
3 SAT.1	14 BR	25 CNN INT.
4 RTL	15 N3	26 HOT
5 VOX	16 MDR3	27 TIDO
6 S-RTL	17 KIKA	28 VH1
7 N-TV	18 PHOENIX	29 VIVA
8 DSF	19 BR-ALPHA	30 TRT1
9 TM3	20 3SAT	31 TV5
10 PRO7	21 EUROSPRT	32

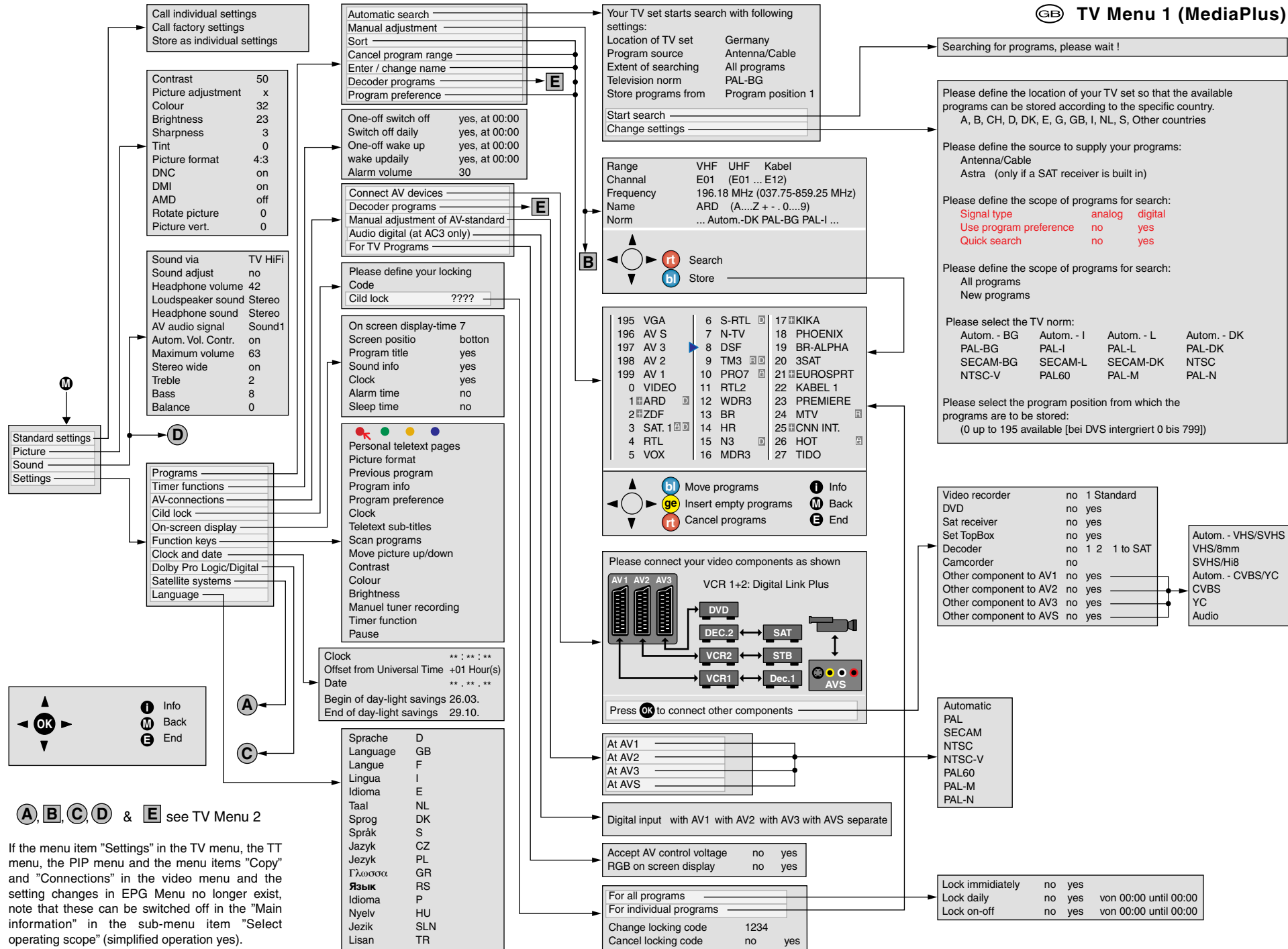
Auswählen und mit OK markieren
 Info
 Zurück
 Ende

D Hauptinformation

Taste "i" auf der Fernbedienung



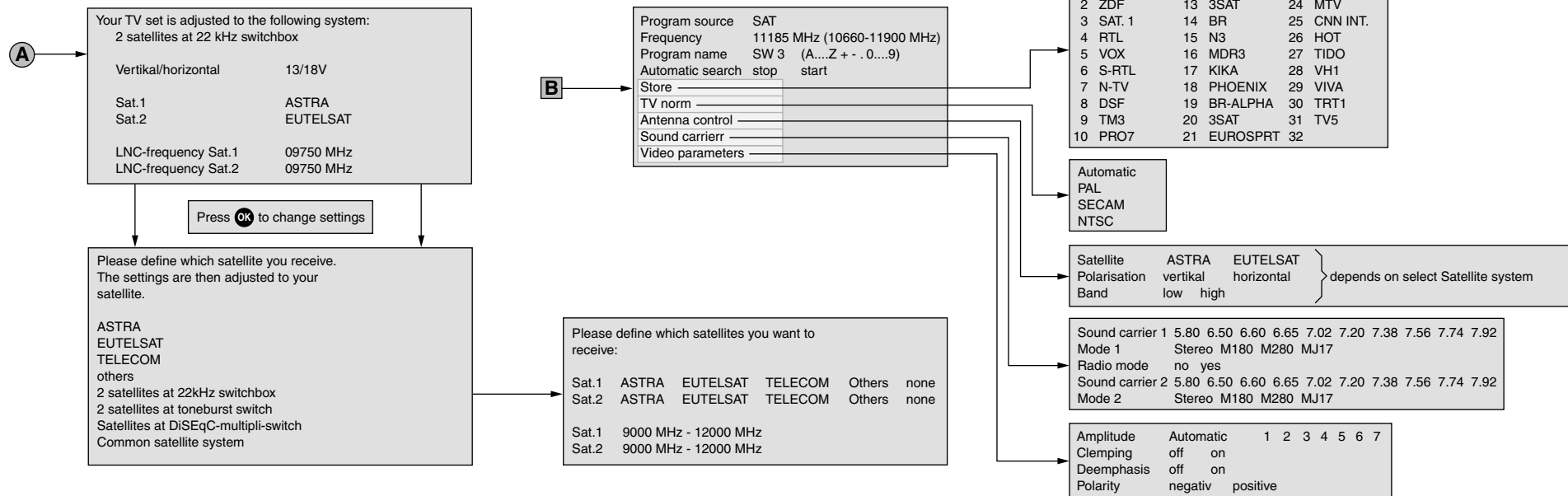
TV Menu 1 (MediaPlus)



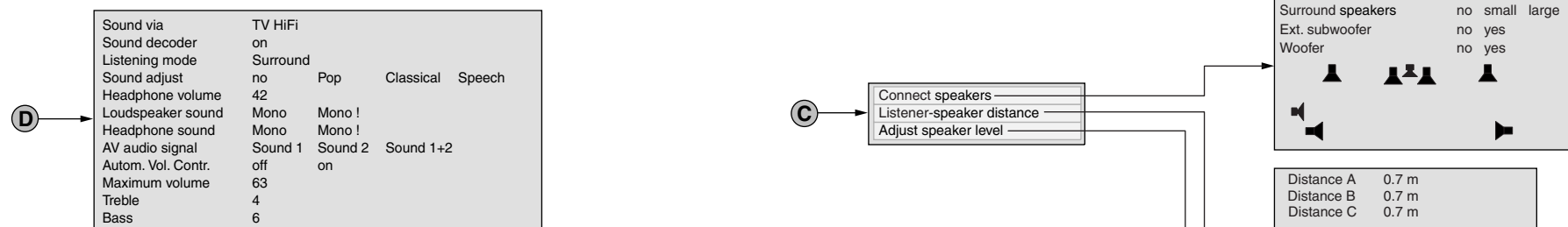
A, B, C, D & E see TV Menu 2

If the menu item "Settings" in the TV menu, the TT menu, the PIP menu and the menu items "Copy" and "Connections" in the video menu and the setting changes in EPG Menu no longer exist, note that these can be switched off in the "Main information" in the sub-menu item "Select operating scope" (simplified operation yes).

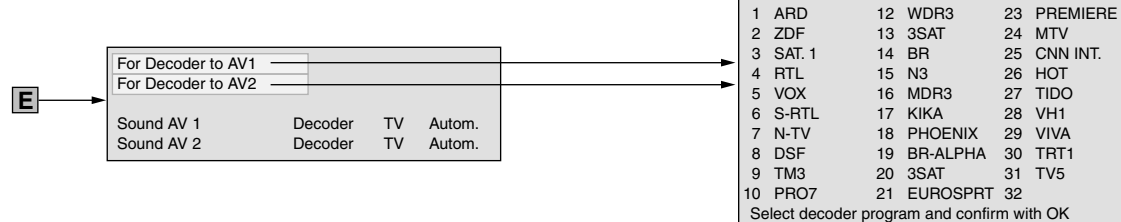
Changes to the menu with installed SAT VI



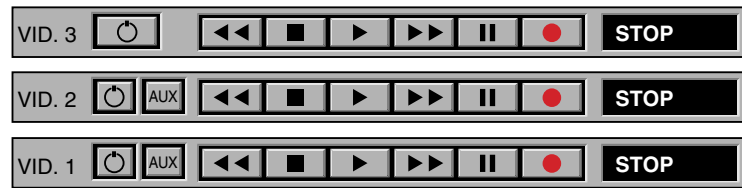
Changes to the menu with connected Dolby decoder



Changes to the menu with connected decoder

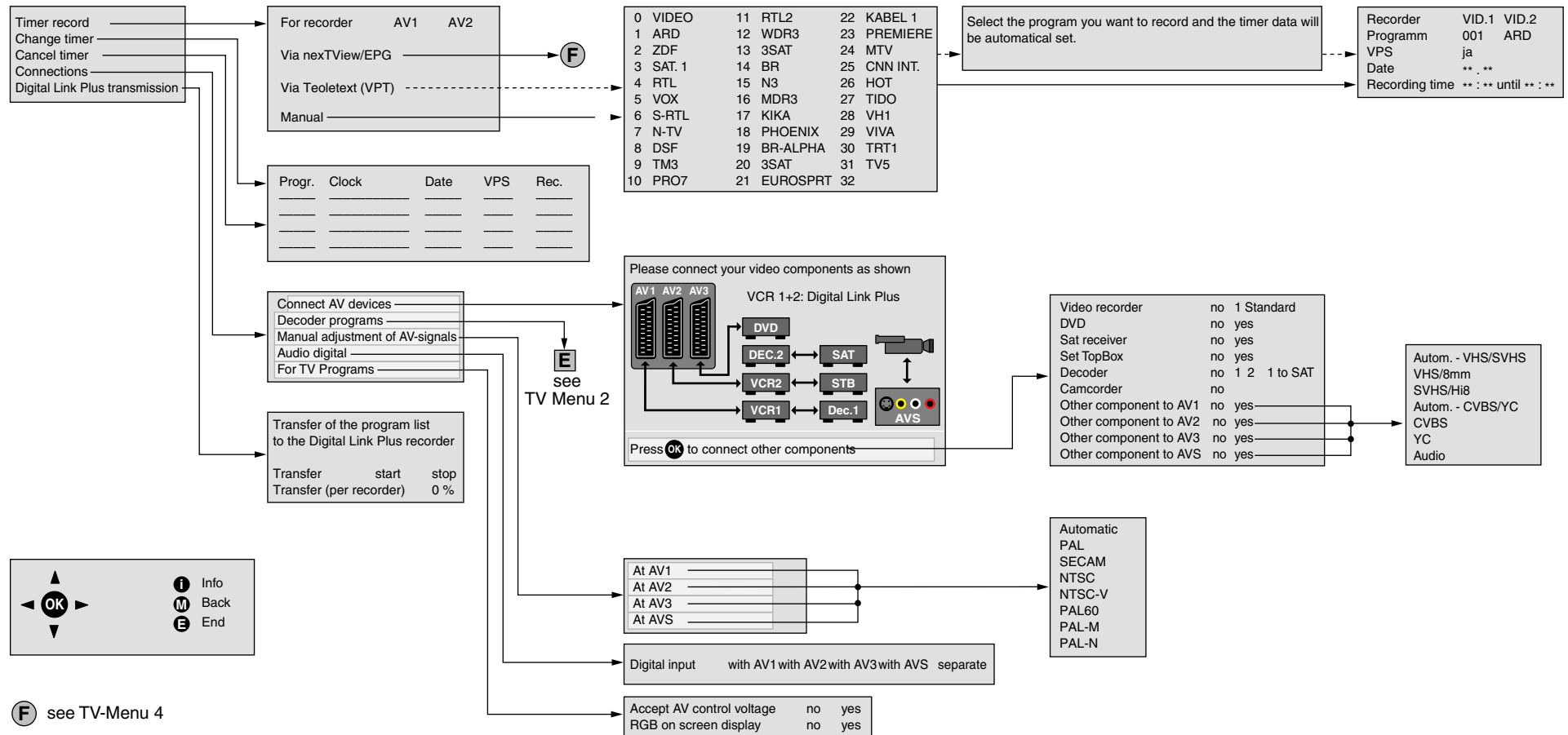


Video operation via TV Menu → V=



M Video menu
E End

Video menu



nextView Menu: (Button nextView respectively EPG of the remote control)

Fr. 08.10. now soon 17:30 18:00 18:30...

16:10	BR	Flucht in die Dolomiten	-17:30
16:50	VOX	Ein ganz normaler Heiliger (13)	
17:00	RTL2	Der Hotelboy (17)	
17:00	RTL	Hans Meiser	

Heimatabenteuer - BRD - 1955
- Regie: Luis Trenker * Wieder mal ruft der Berg: Luis Trenker unter Mordverdacht

Select and view with OK (OK button)
Recording (rt button)
Day Themes (gn button)
Programme preview (bl button)
Menu (M button)
End (E button)

F

M

List of memorized programmes -
Programme selection -
Station -

Switch on TV	no	yes
Memorized programme	report	view
Data acquisition	off	on
Short info lines	none	3 4 5 6
Initial theme list	current theme	all themes

08.10.	19:00	ZDF	Schloßhotel Orth
09.10.	19:00	BR	Rundschau
10.10.	04:40	ZDF	Länderspiegel
10.10.	05:00	RTL	Beverly Hills, 90210
10.10.	19:15	VOX	Voxtours - Das Reisemaga
11.10.	04:40	ARD	Presseclub

Select and delete with OK (OK button)
Back (M button)
End (E button)

0 VIDEO	11 RTL2	22 KABEL 1
1 ARD	12 WDR3	23 PREMIERE
2 ZDF	13 3SAT	24 MTV
3 SAT. 1	14 BR	25 CNN INT.
4 RTL	15 N3	26 HOT
5 VOX	16 MDR3	27 TIDO
6 S-RTL	17 KIKA	28 VH1
7 N-TV	18 PHOENIX	29 VIVA
8 DSF	19 BR-ALPHA	30 TRT1
9 TM3	20 3SAT	31 TV5
10 PRO7	21 EUROSPRT	32

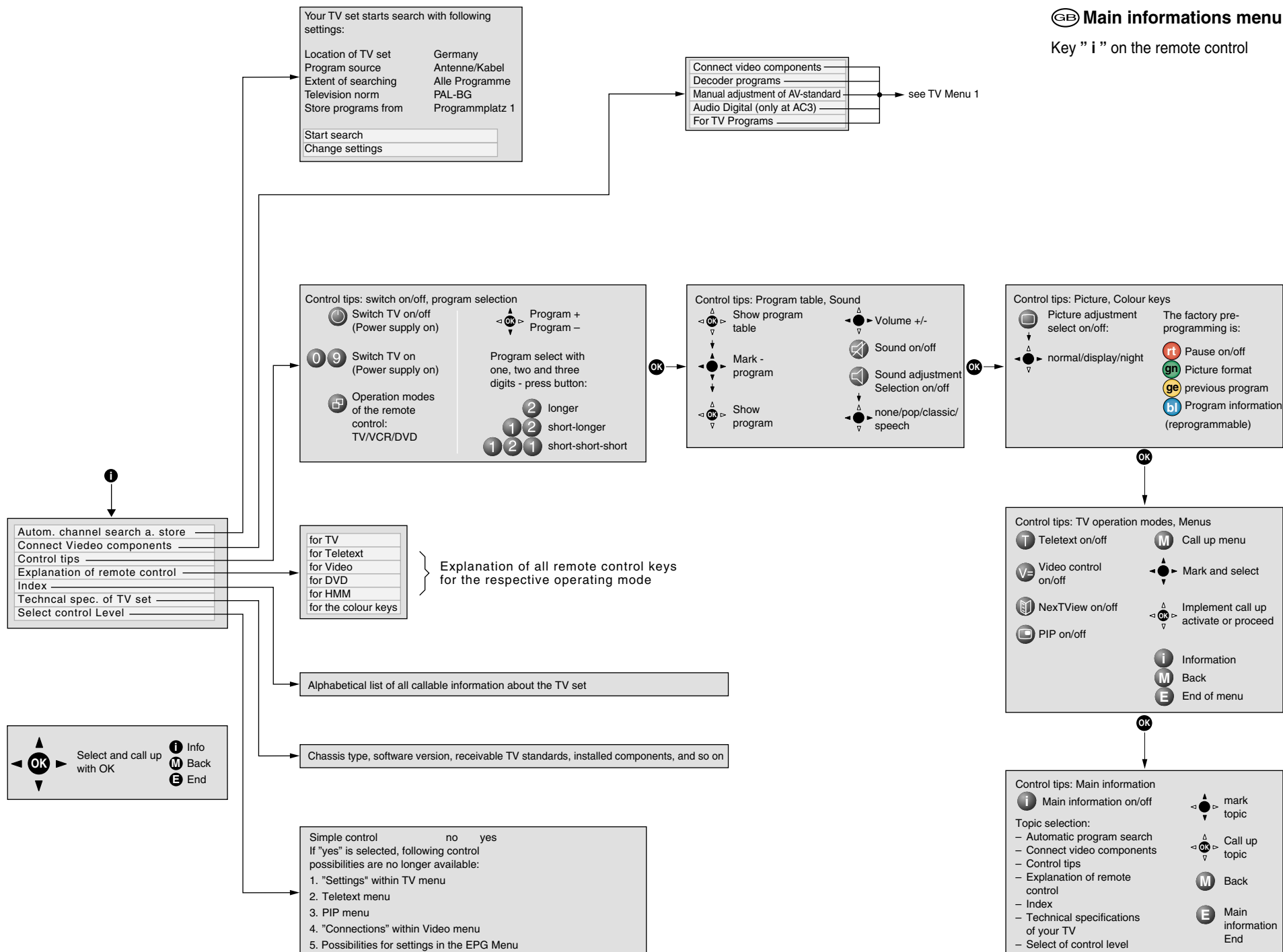
Select and mark with OK (OK button)
mark (rt button)
mark all (gn button)
mark none (ge button)
Info (I button)
Back (M button)
End (E button)

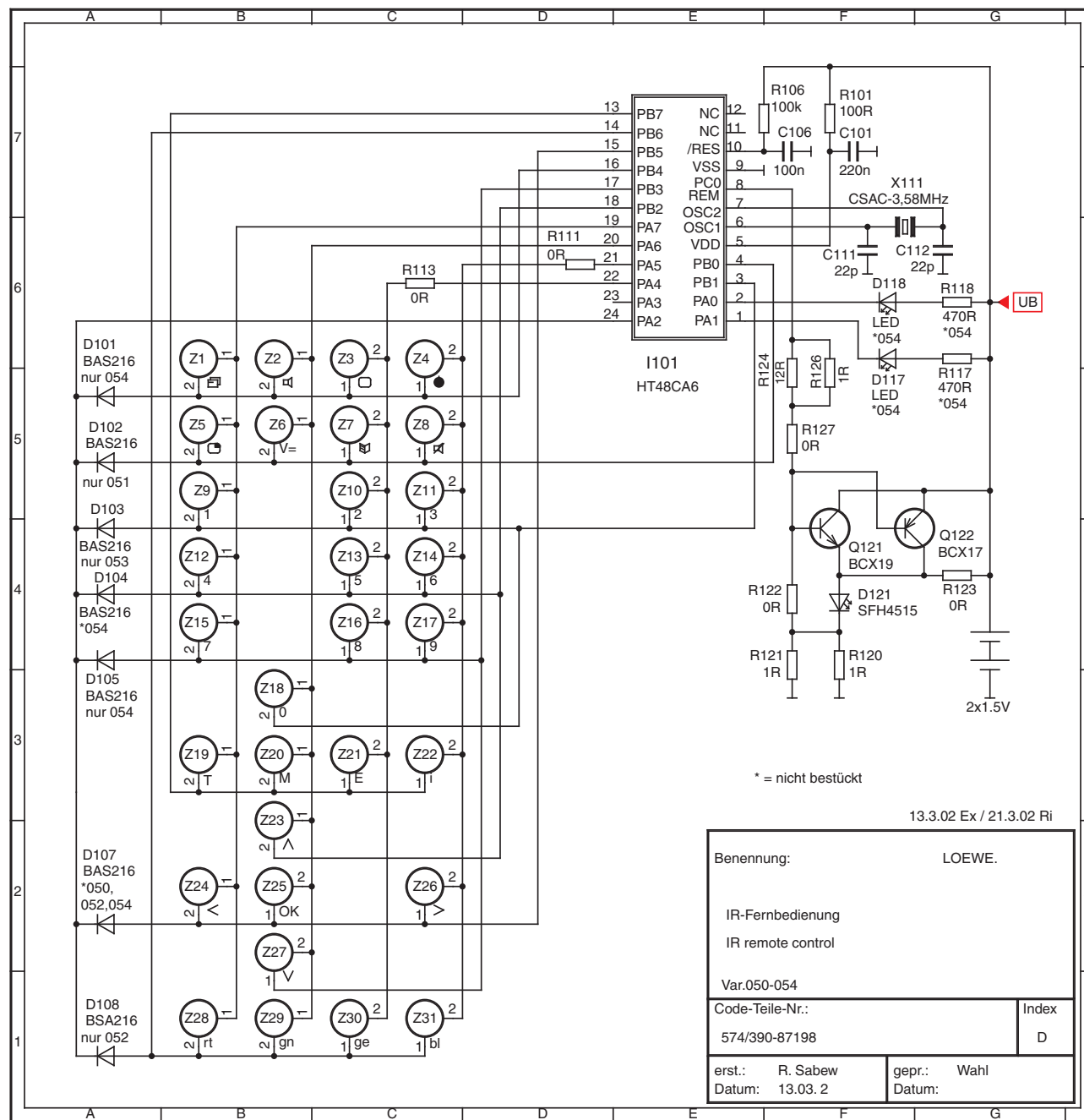
0 VIDEO	11 RTL2	22 KABEL 1
1 ARD	12 WDR3	23 PREMIERE
2 ZDF	13 3SAT	24 MTV
3 SAT. 1	14 BR	25 CNN INT.
4 RTL	15 N3	26 HOT
5 VOX	16 MDR3	27 TIDO
6 S-RTL	17 KIKA	28 VH1
7 N-TV	18 PHOENIX	29 VIVA
8 DSF	19 BR-ALPHA	30 TRT1
9 TM3	20 3SAT	31 TV5
10 PRO7	21 EUROSPRT	32

Select and mark with OK (OK button)
Info (I button)
Back (M button)
End (E button)

GB Main informations menu

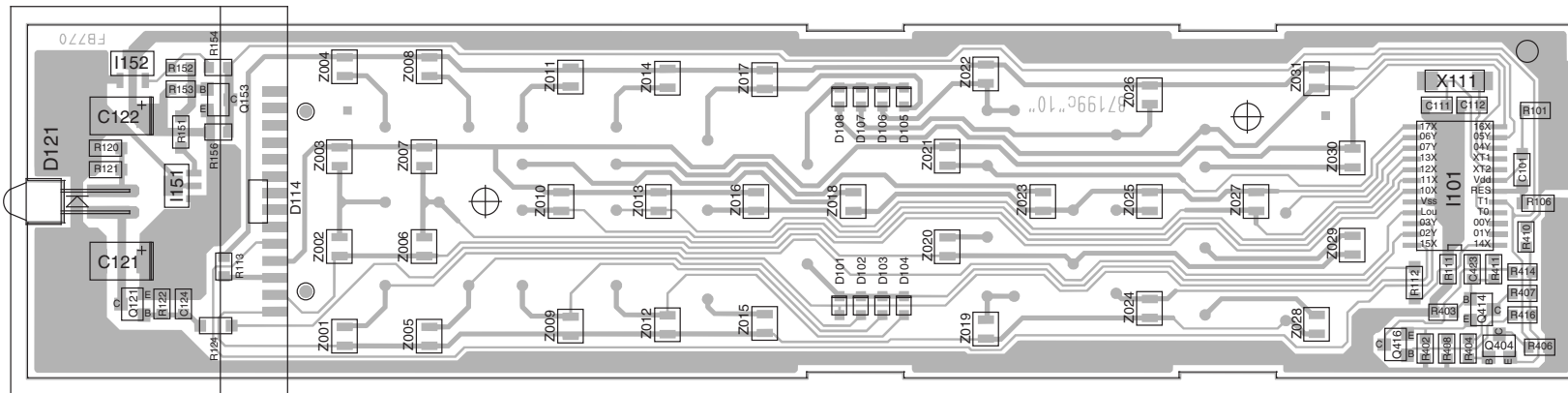
Key "i" on the remote control





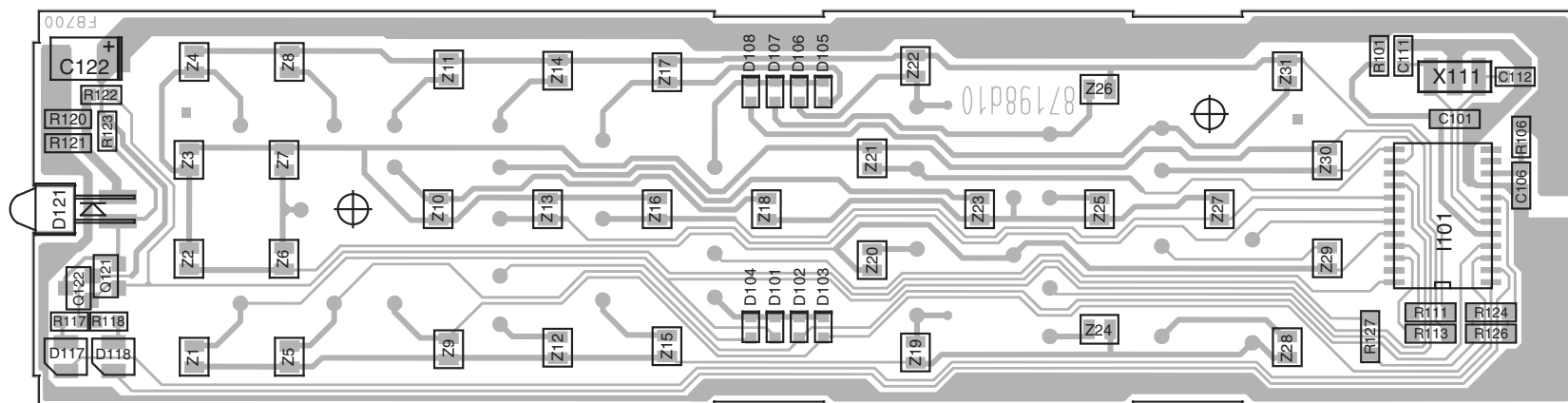
Schaltbild Fernbedienung 87000.060 ab 04/2002

Remote Control schematic 87000.070/071



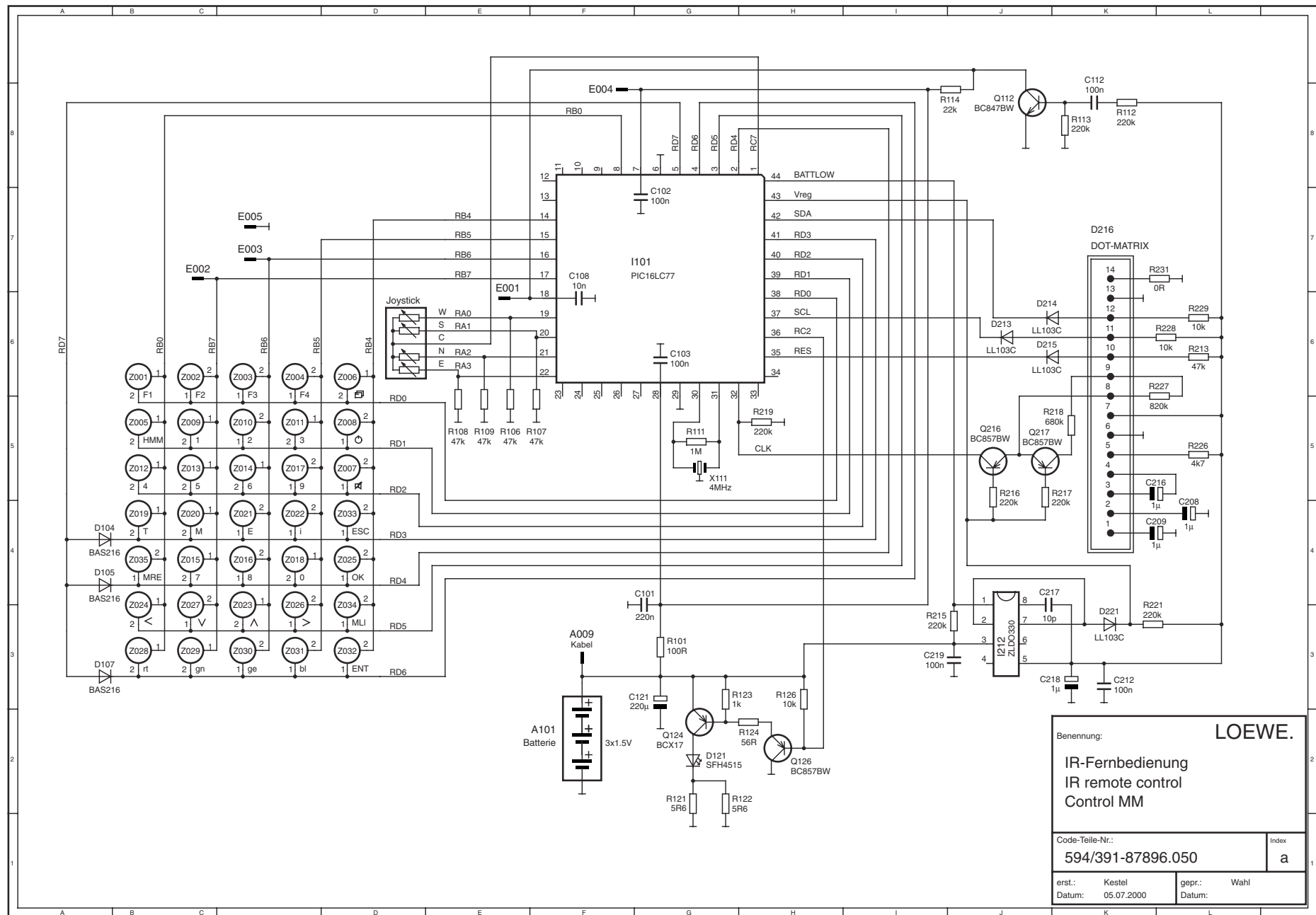
Ltpl. Fernbedienung 87000.070/071 (87199C)

Remote Control P.C.B 87000.070/071 (87199C)



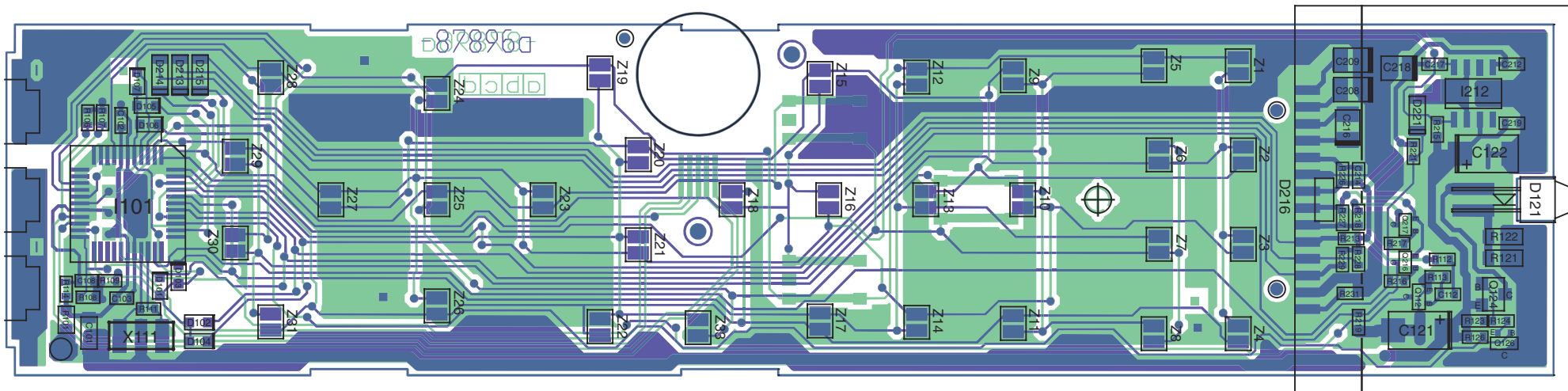
Ltpl. Fernbedienung 87000.050-065 (87198.050-056E) Bestückungsseite

Remote Control P.C.B 87000.050-065 (87198.050-056E) Components side

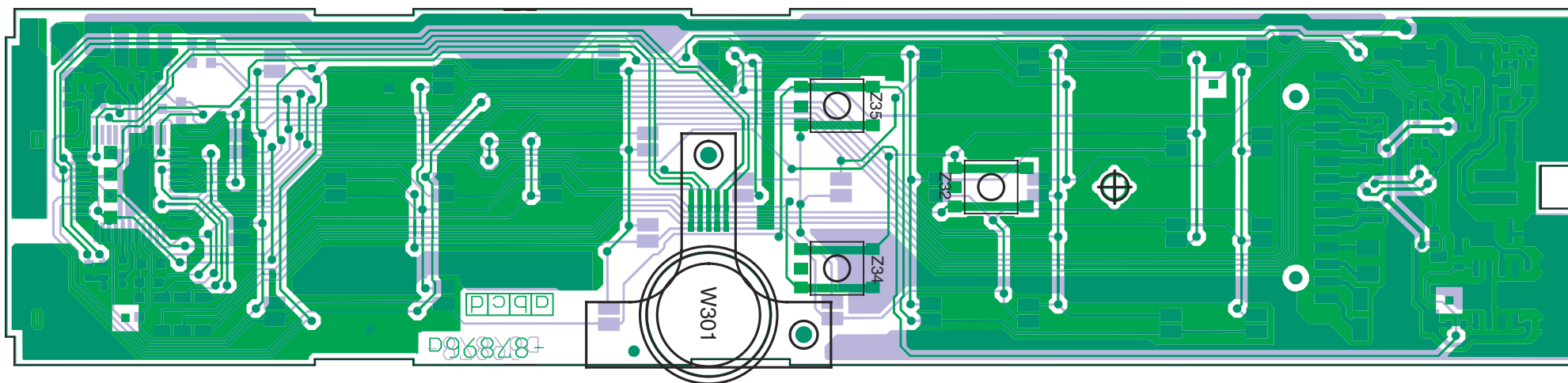


Schaltplan IR-Fernbedienung 396-87000.091

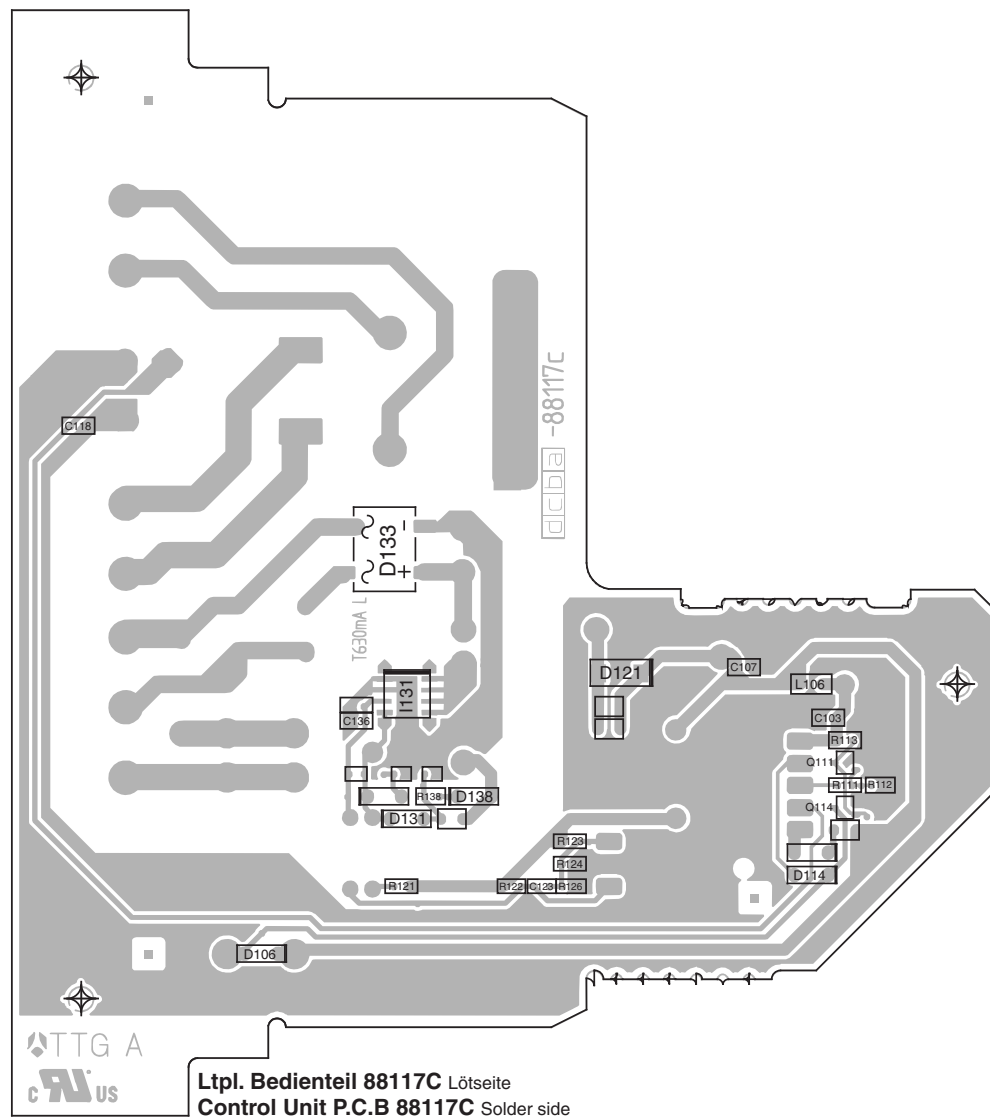
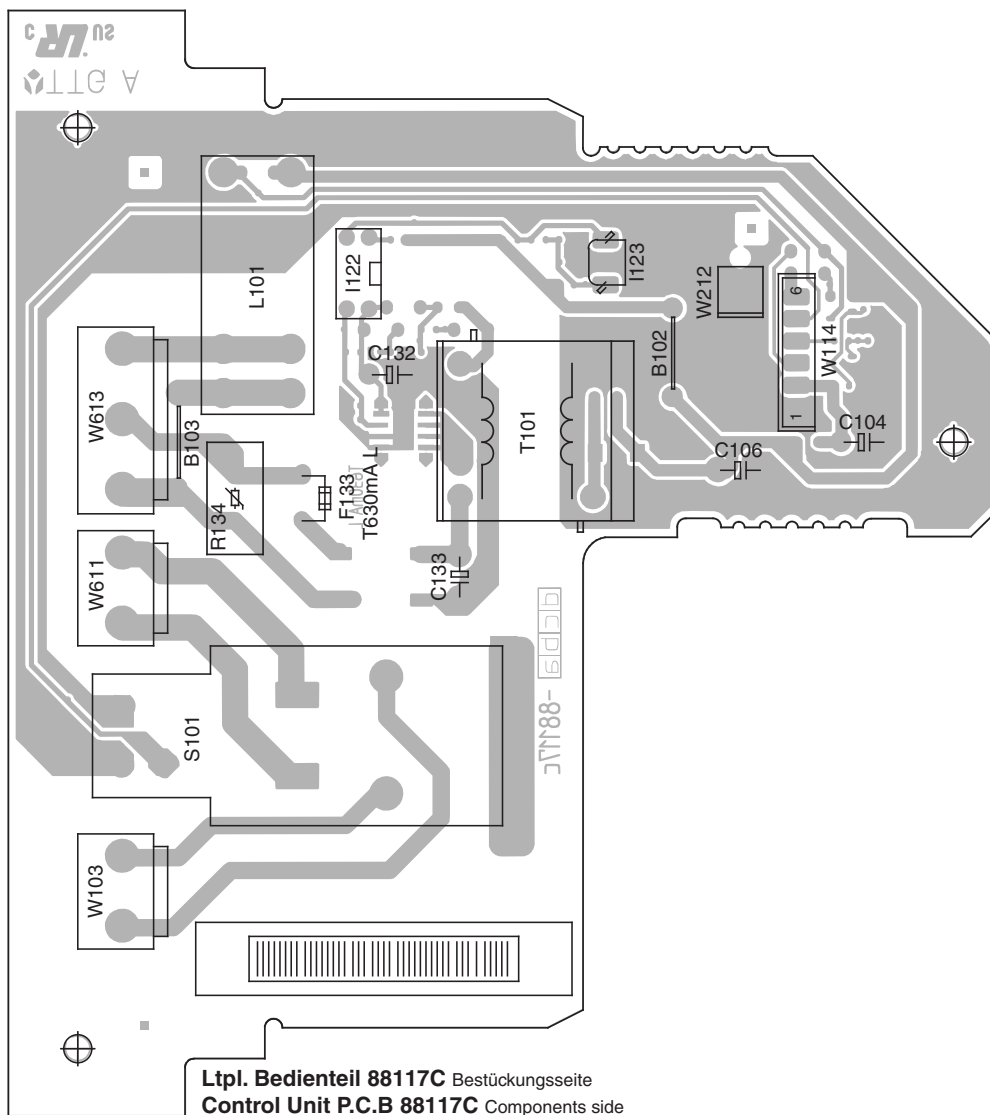
Infrared remote control schematic 396-87000.091

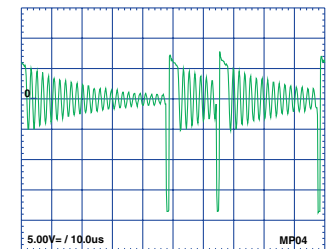
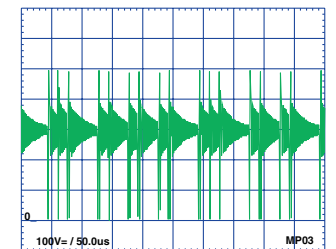
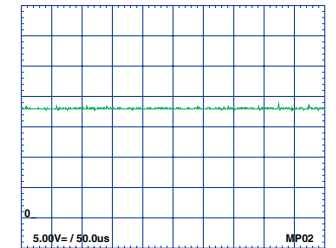
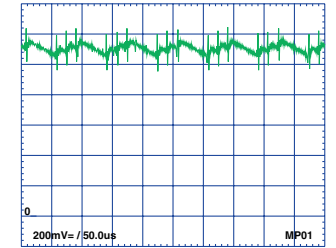
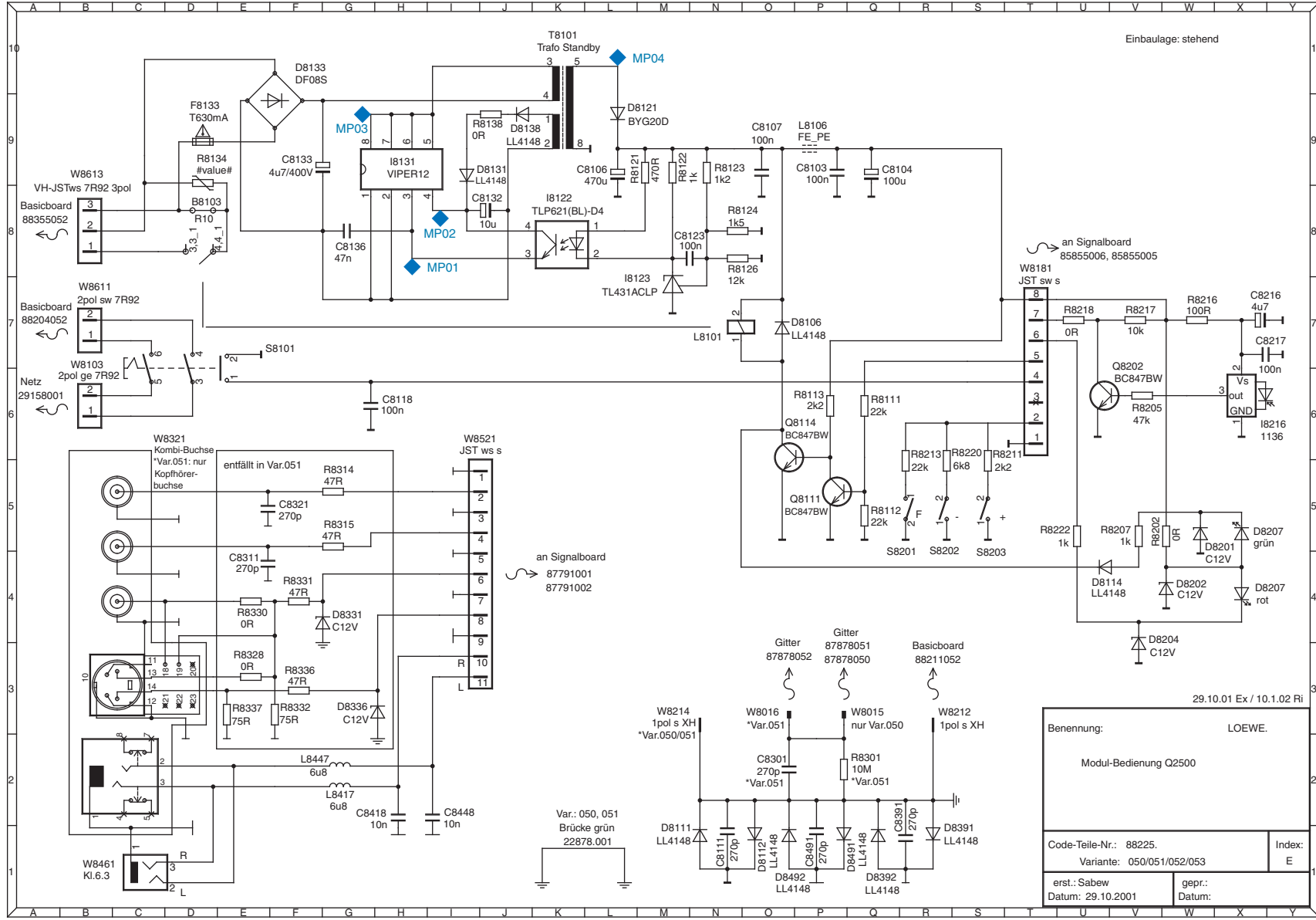


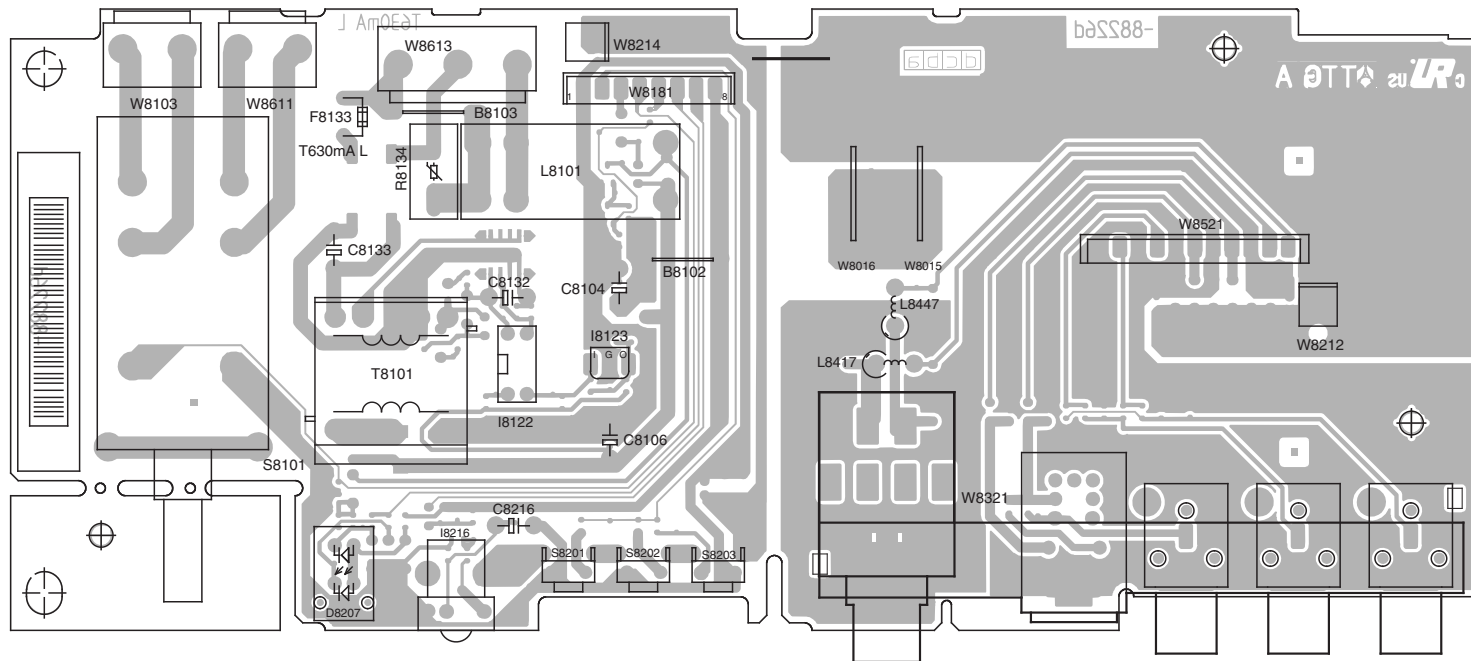
Ltpl. Fernbedienung Remote Control P.C.B 87000.091
 Bestückungsseite Components Side



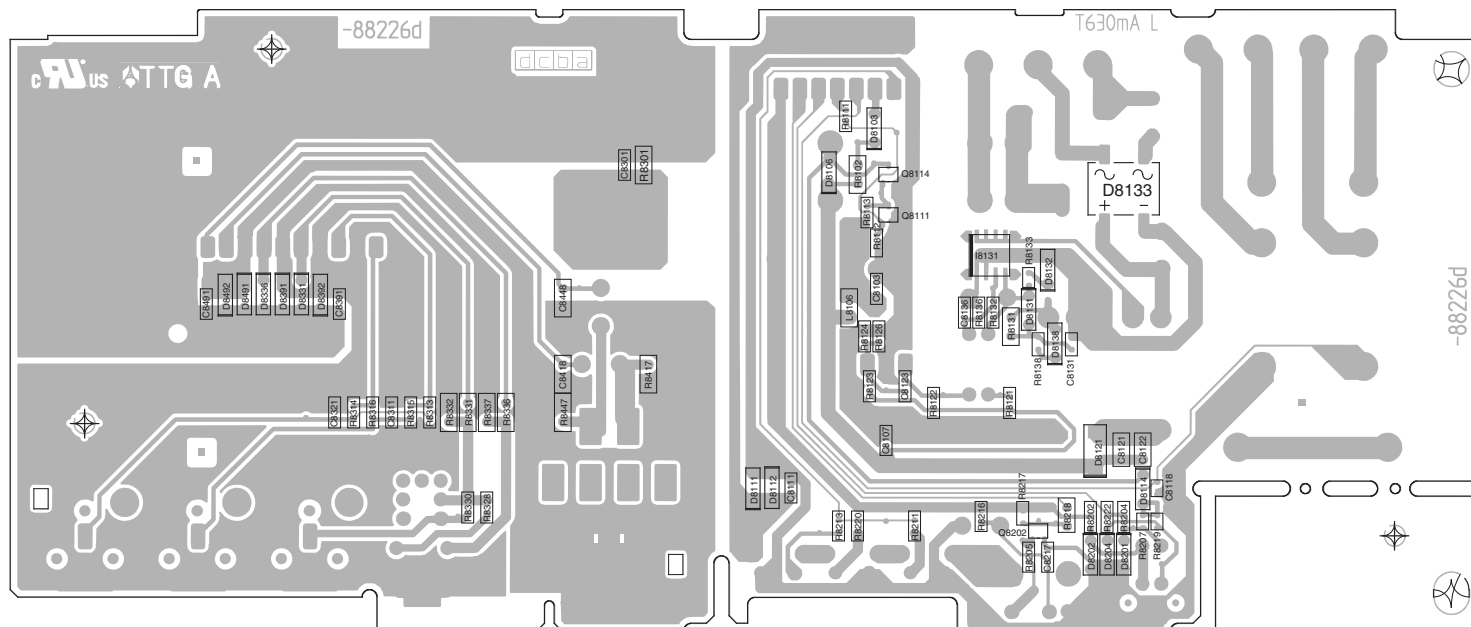
Ltpl. Fernbedienung Remote Control P.C.B 87000.091
 Lötseite Solder Side



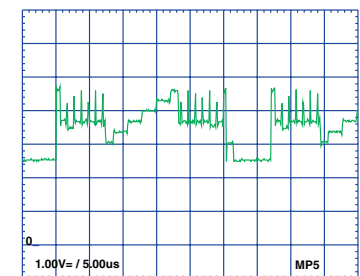
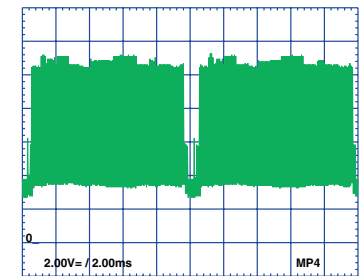
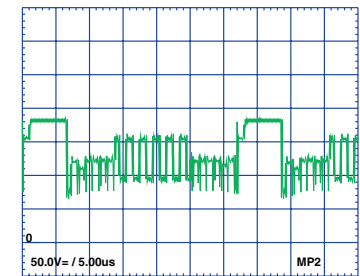
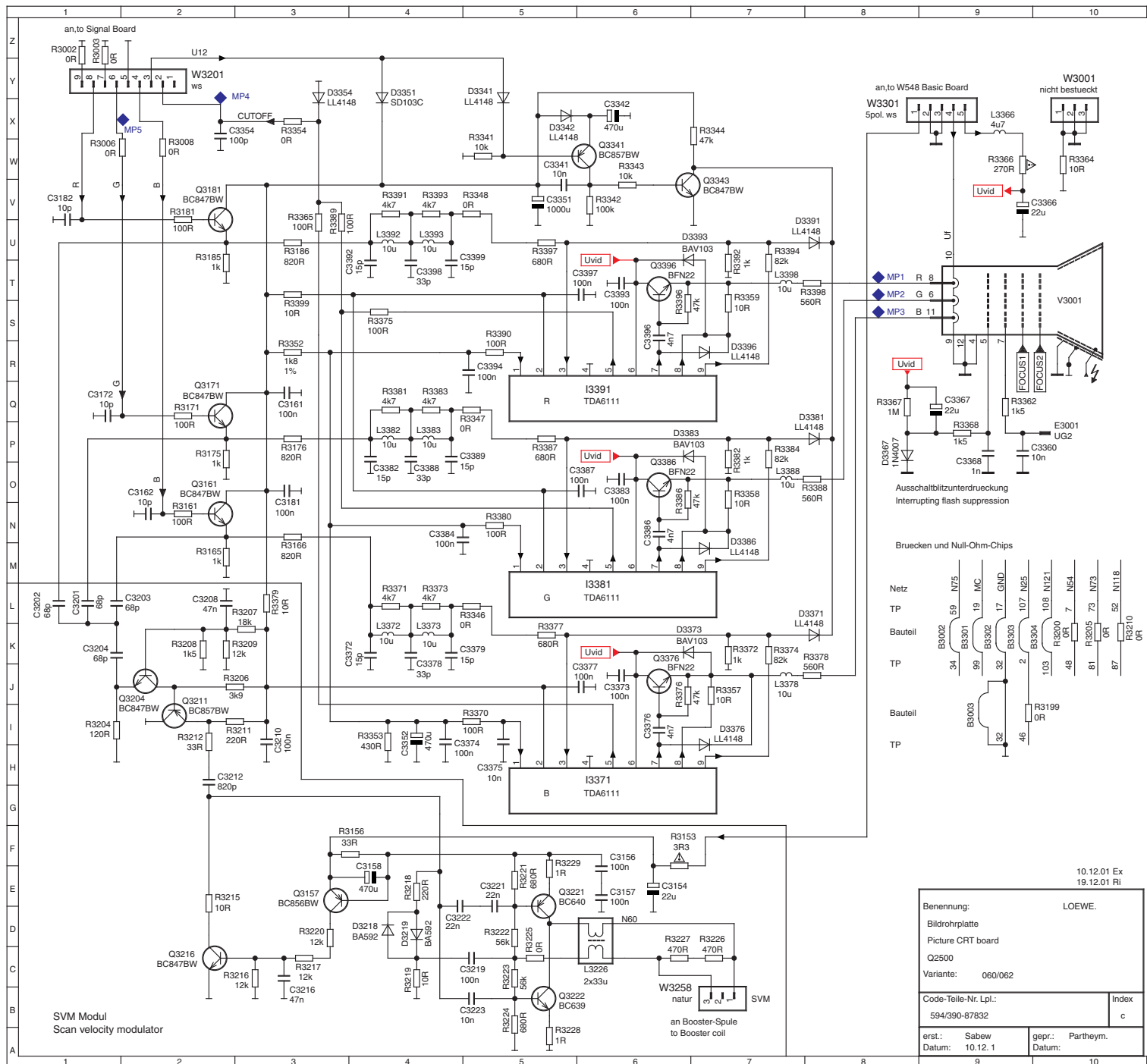




Ltpl. Bedienteil 88226D Bestückungsseite **Control Unit P.C.B 88226D** Components side



Ltpl. Bedienteil 88226D Lötseite **Control Unit P.C.B 88226D** Solder side

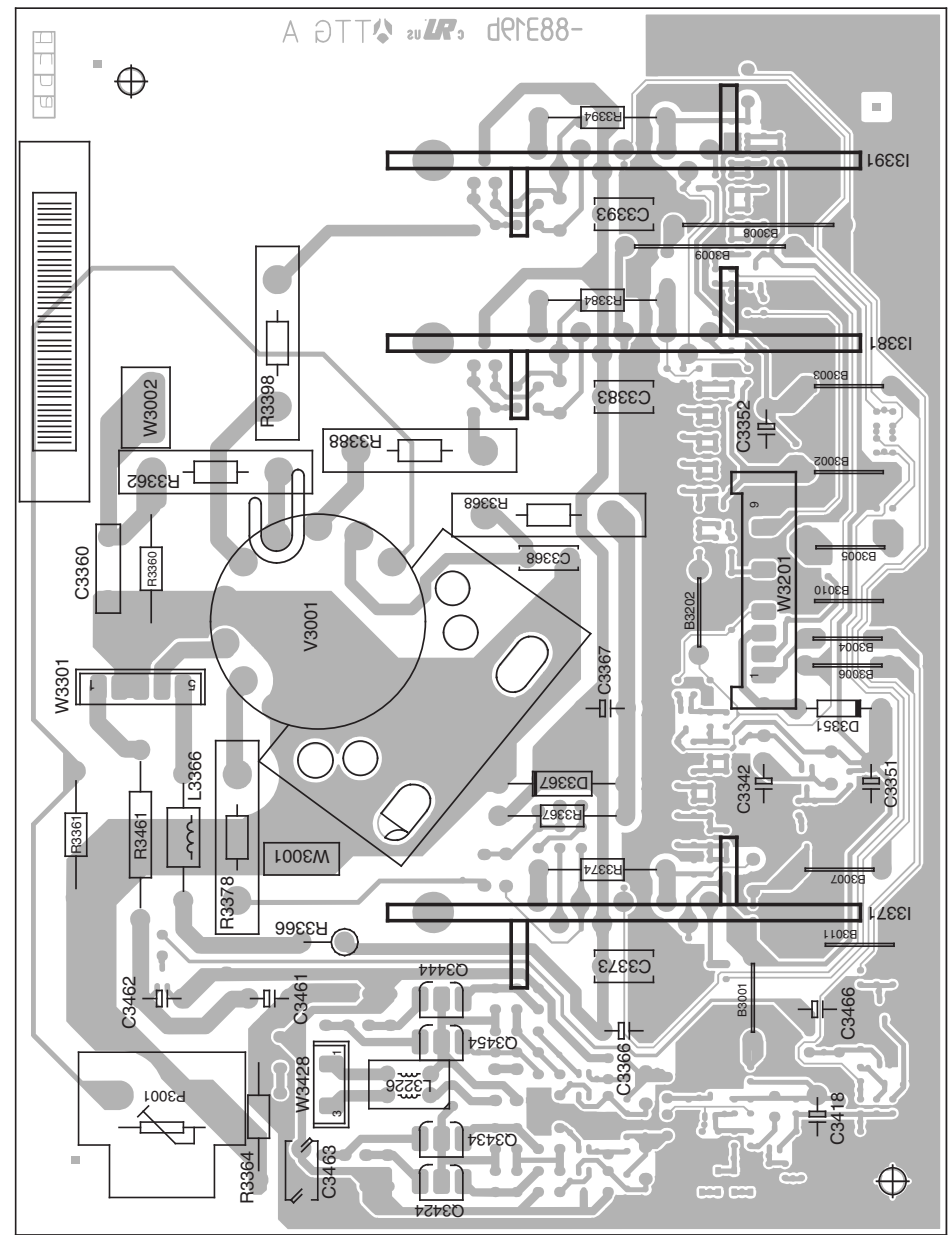
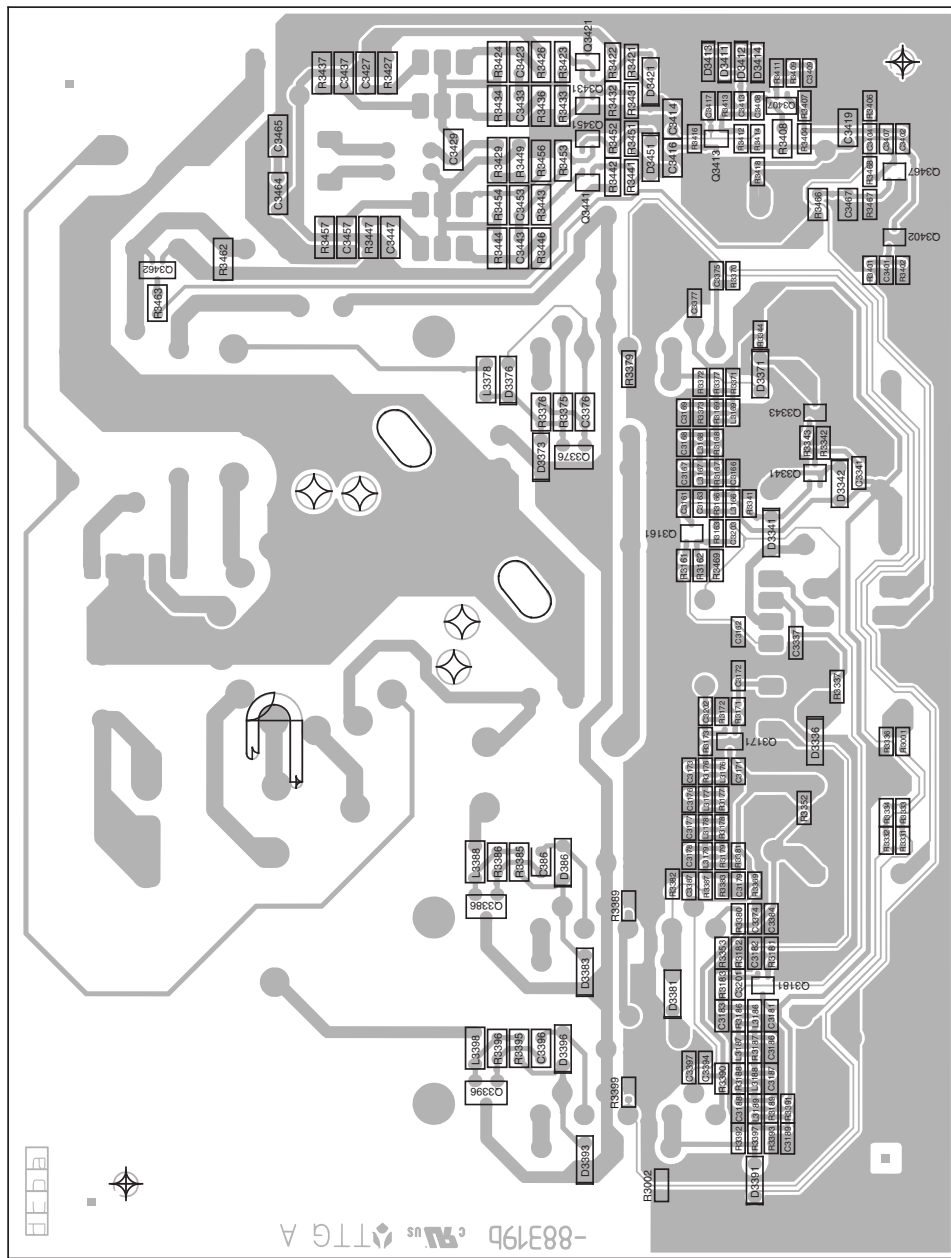


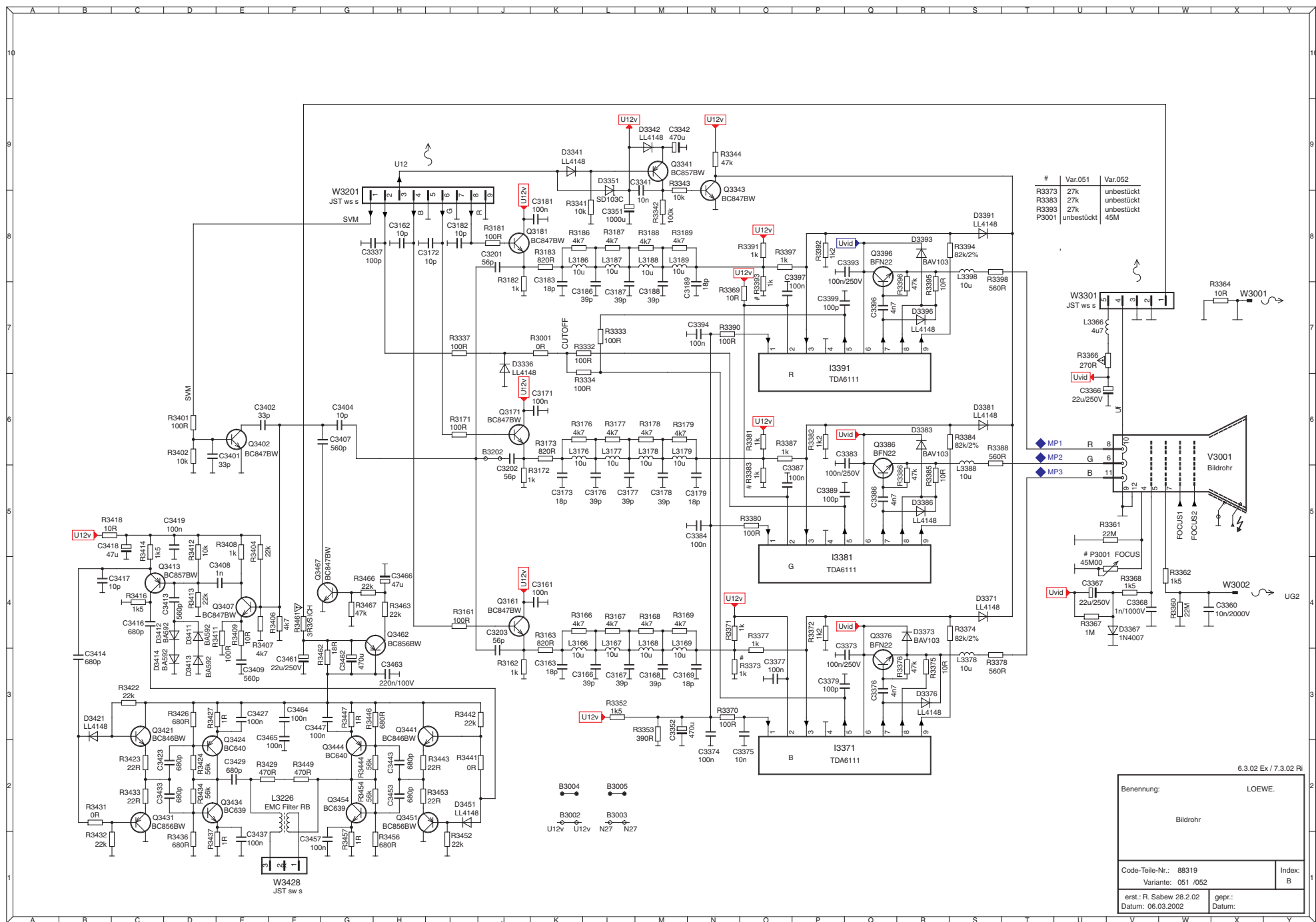


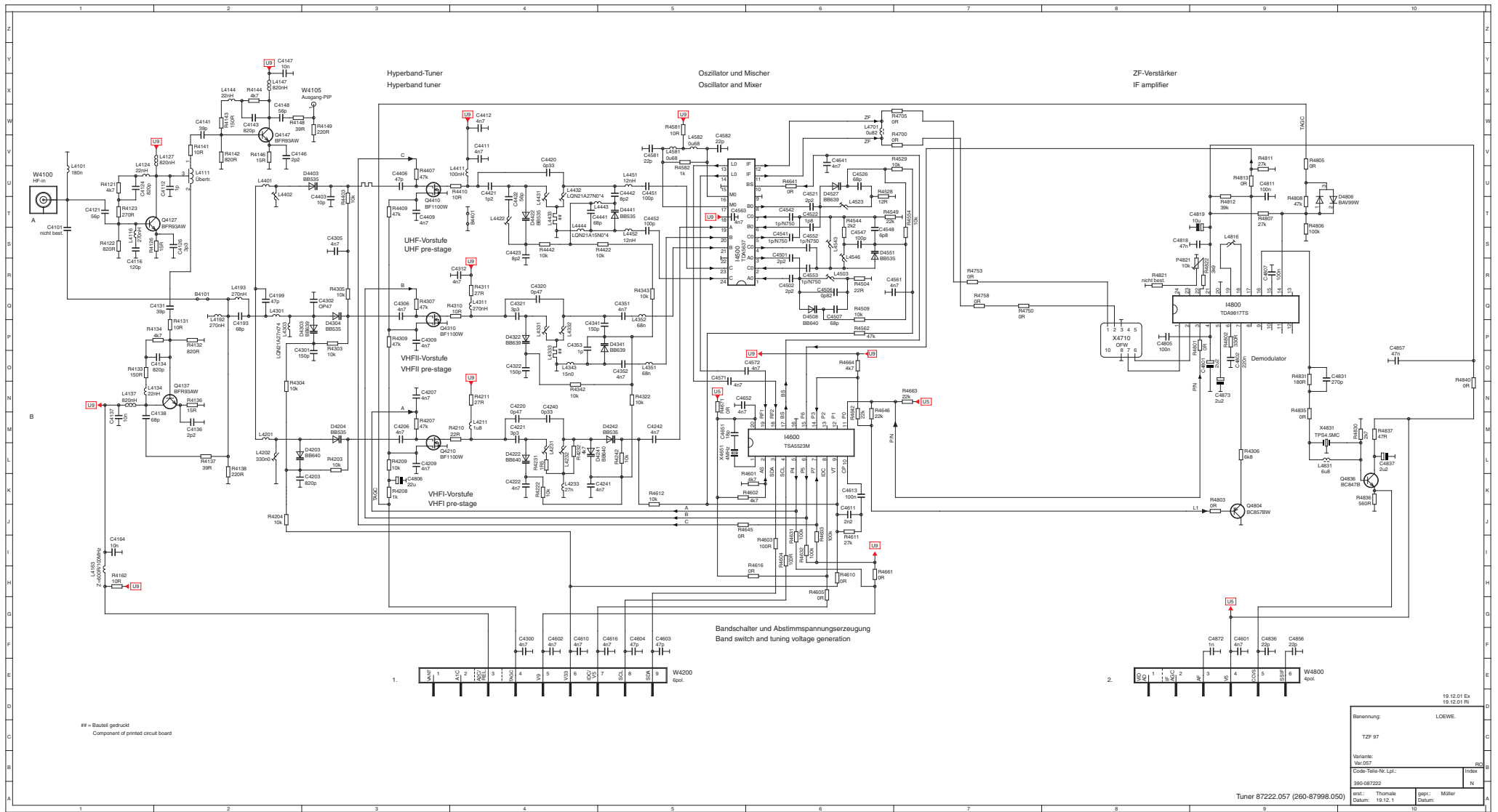
CRT P.C.B 87832C
Components side



CRT P.C.B 87832C
Solder side



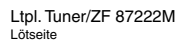




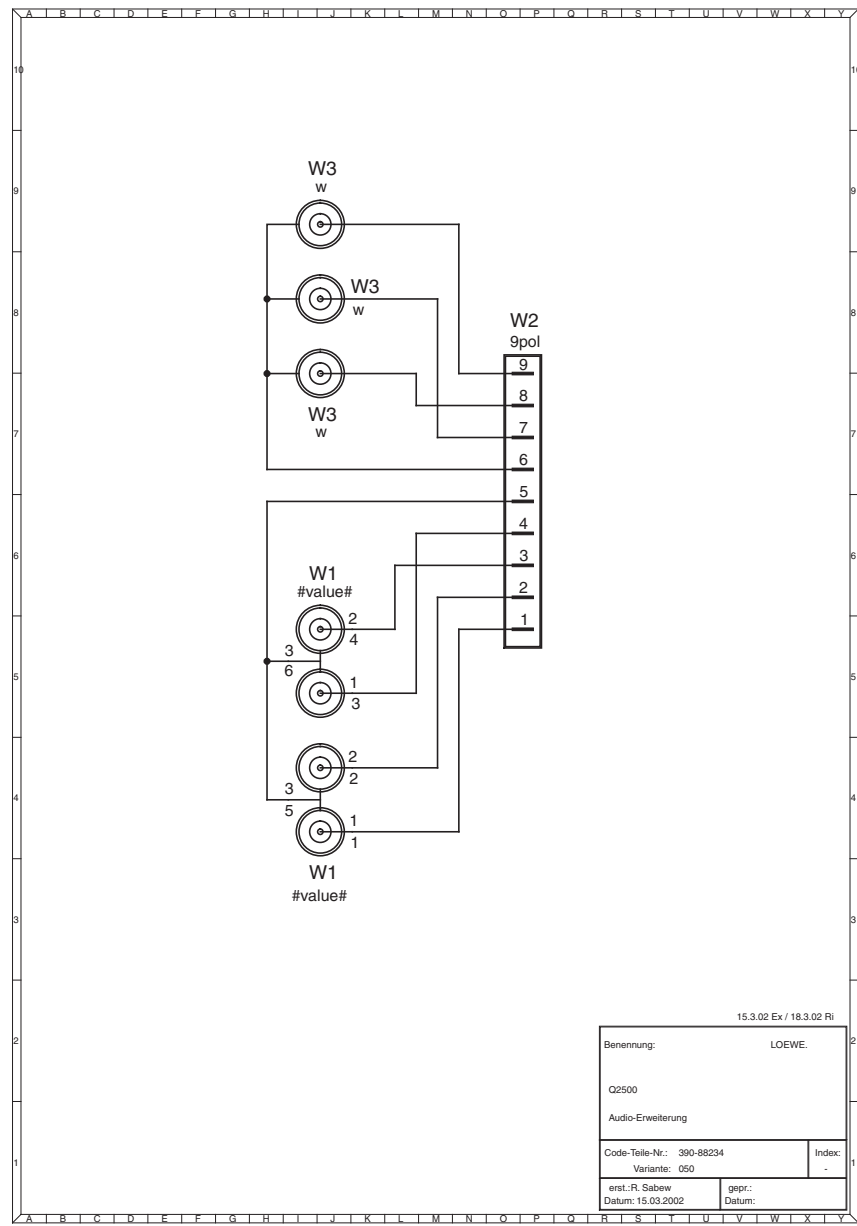




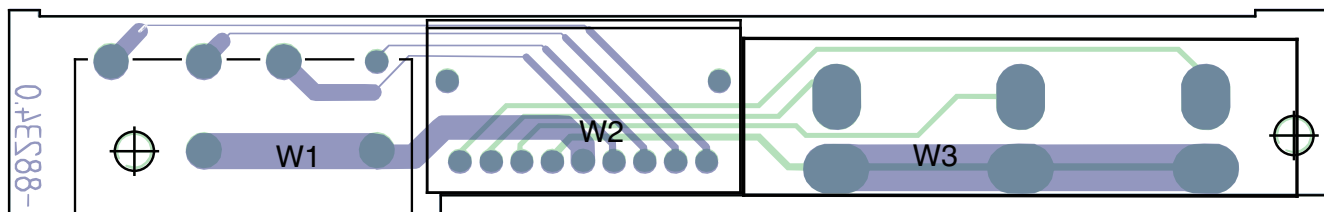
Tuner/IF P.C.B 87222M
Components side



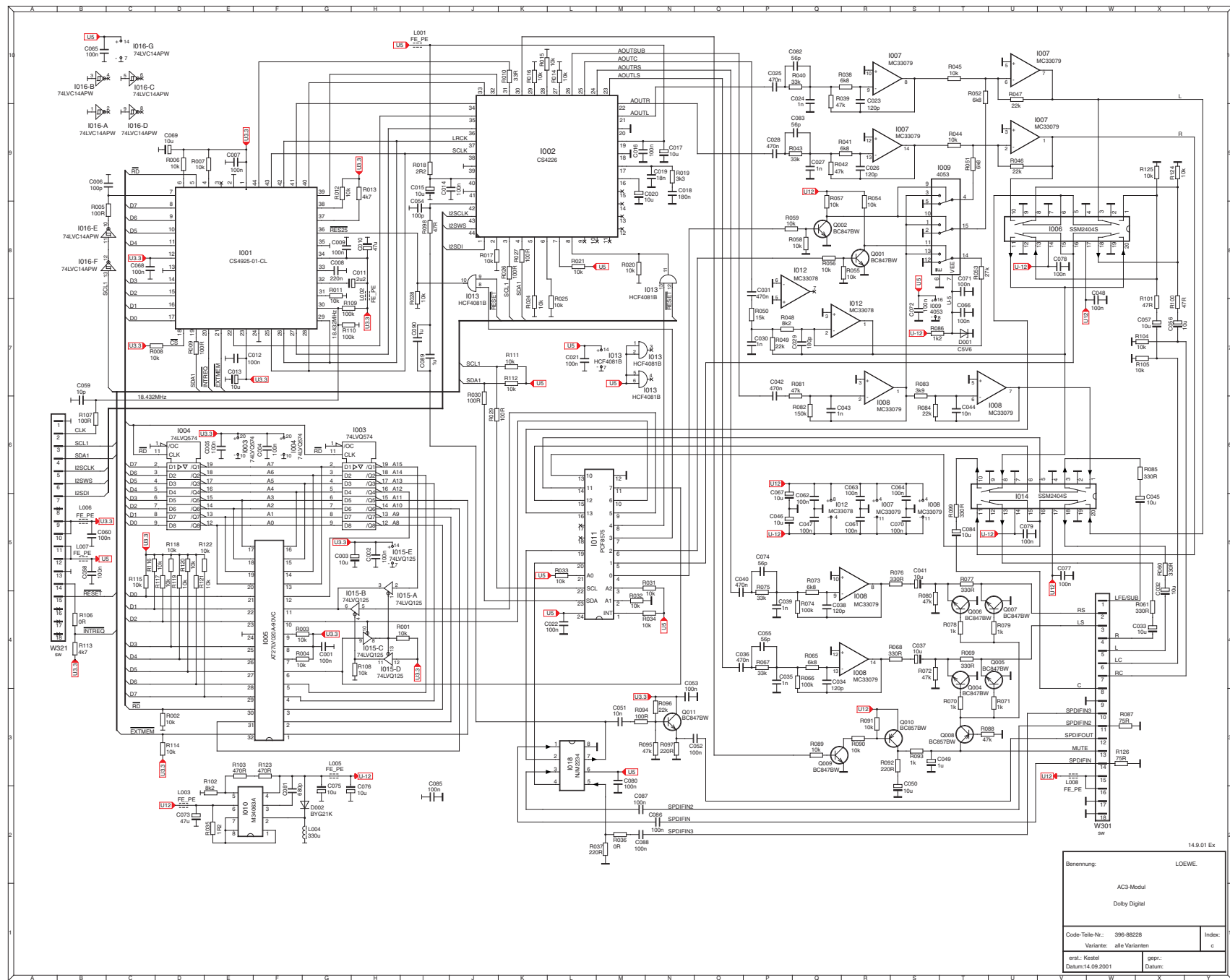
Tuner/IF P.C.B 87222M
Solder Side

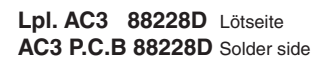
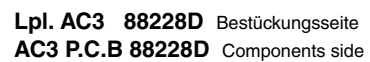


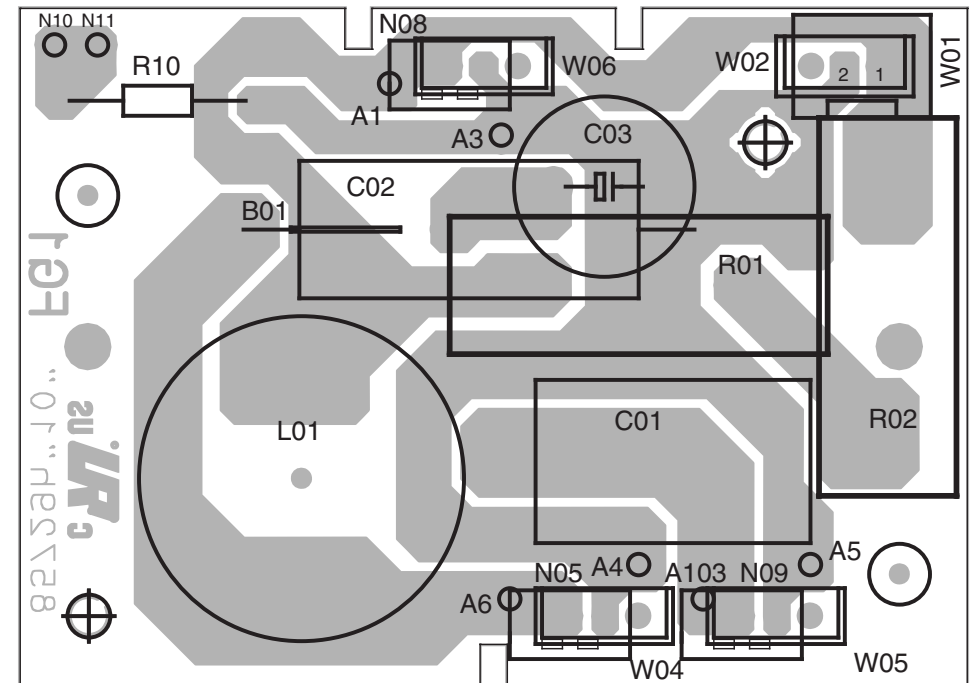
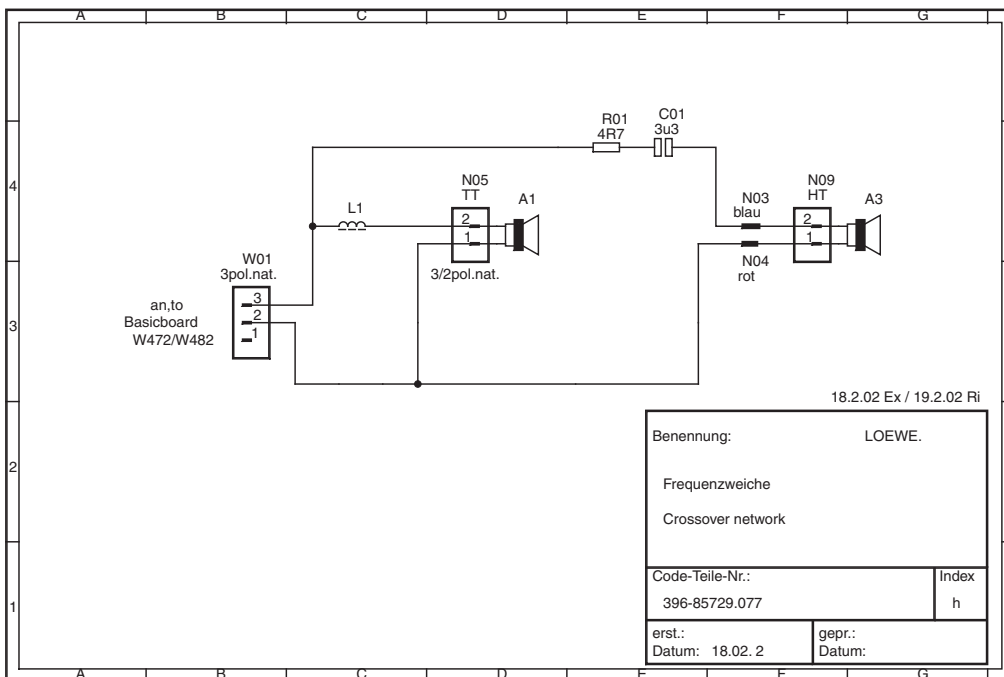
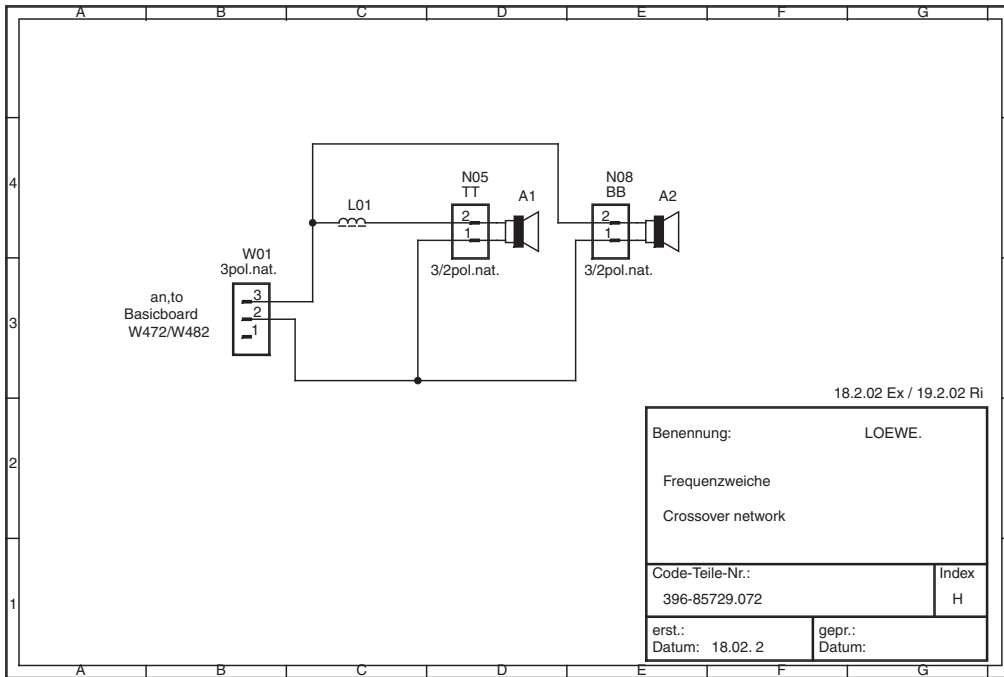
390-88234



Ltpl. Audio-Erweiterung 88234 Bestückungsseite
Audio Extension P.C.B 88234 Components side

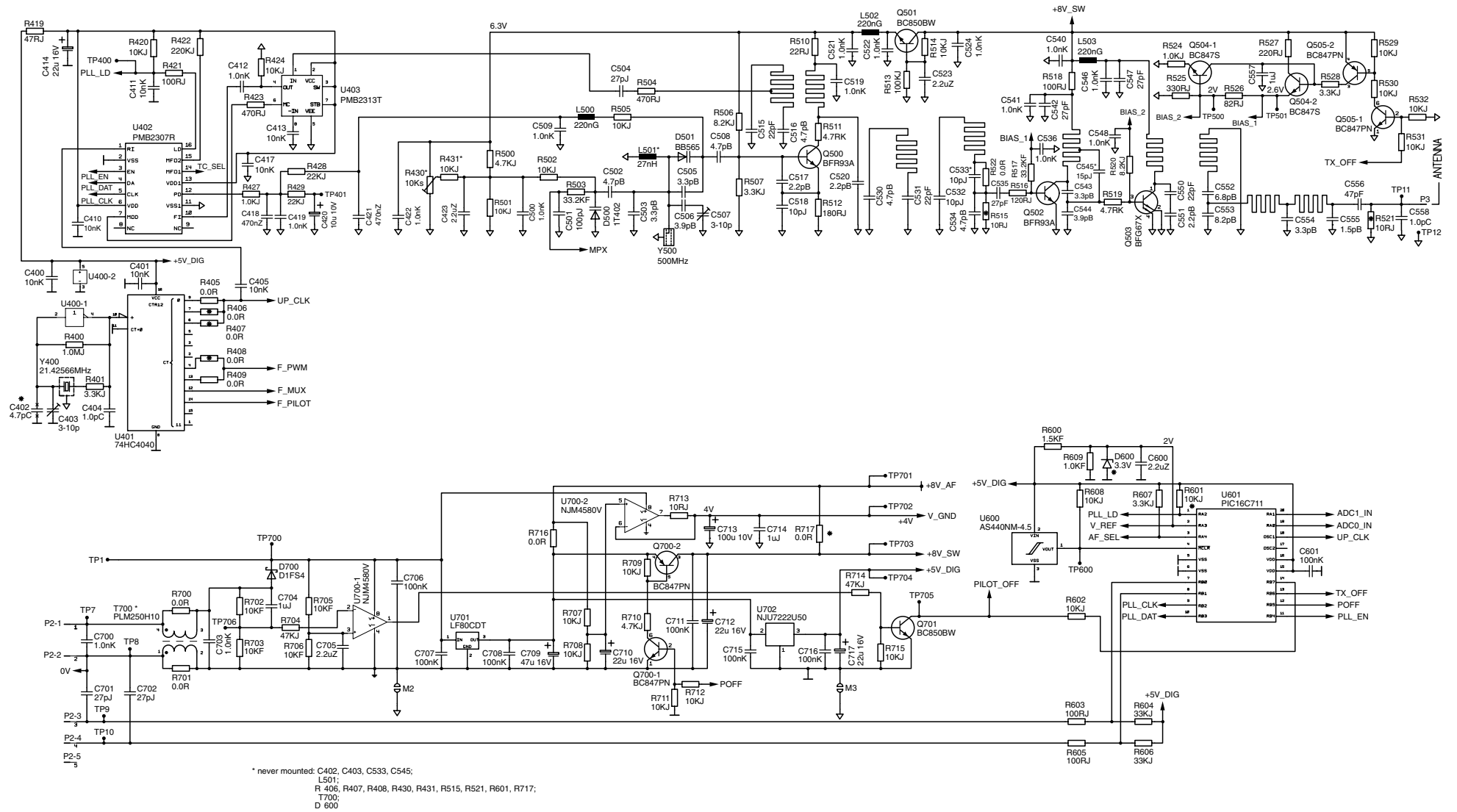






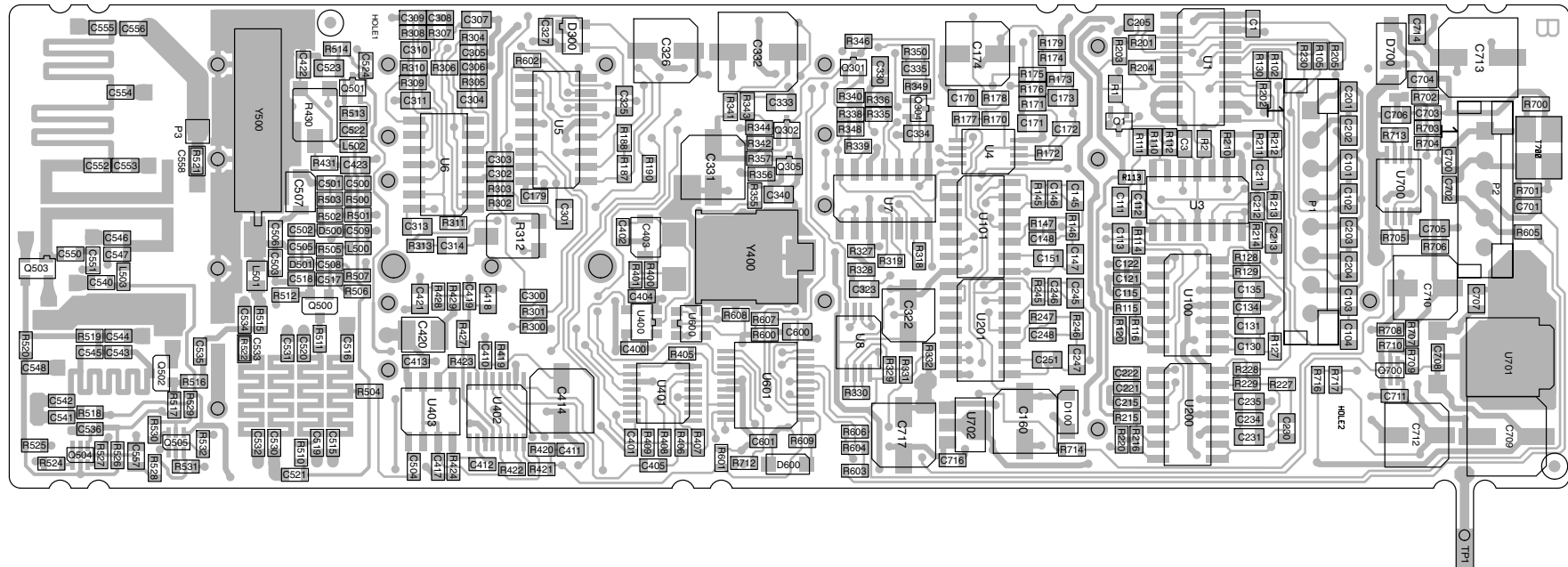
Ltpl. Frequenzweiche 85729H
Bestückungsseite

Cross-over network P.C.B 85729H
Components side

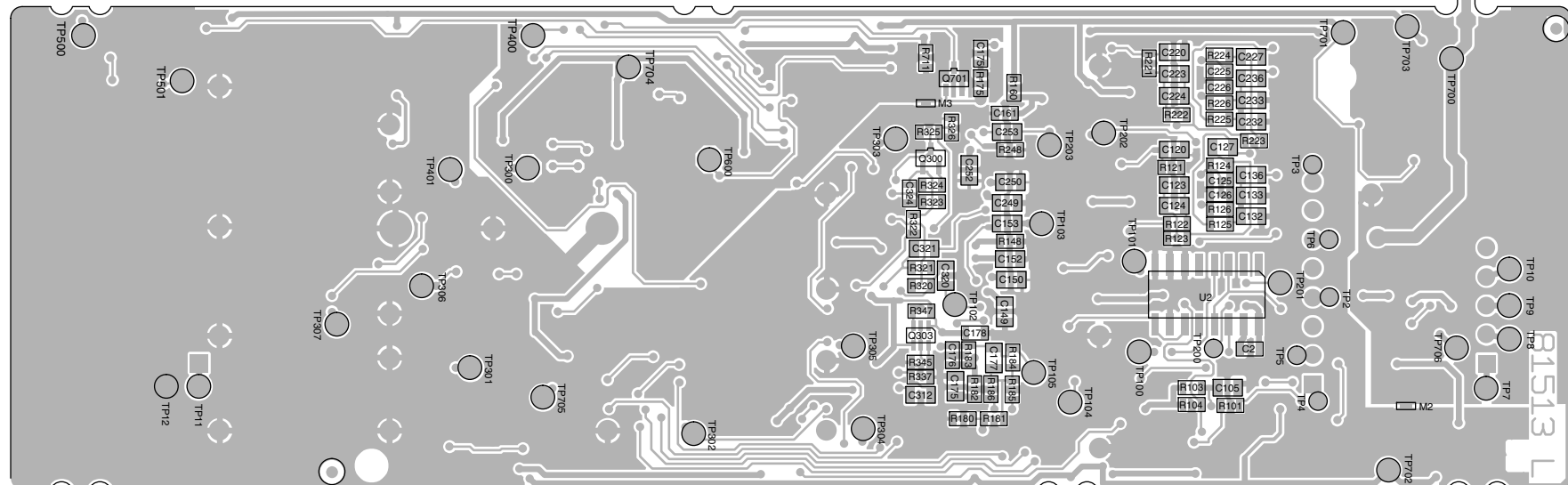


Schaltplan 2 HF-Sender 88066.001

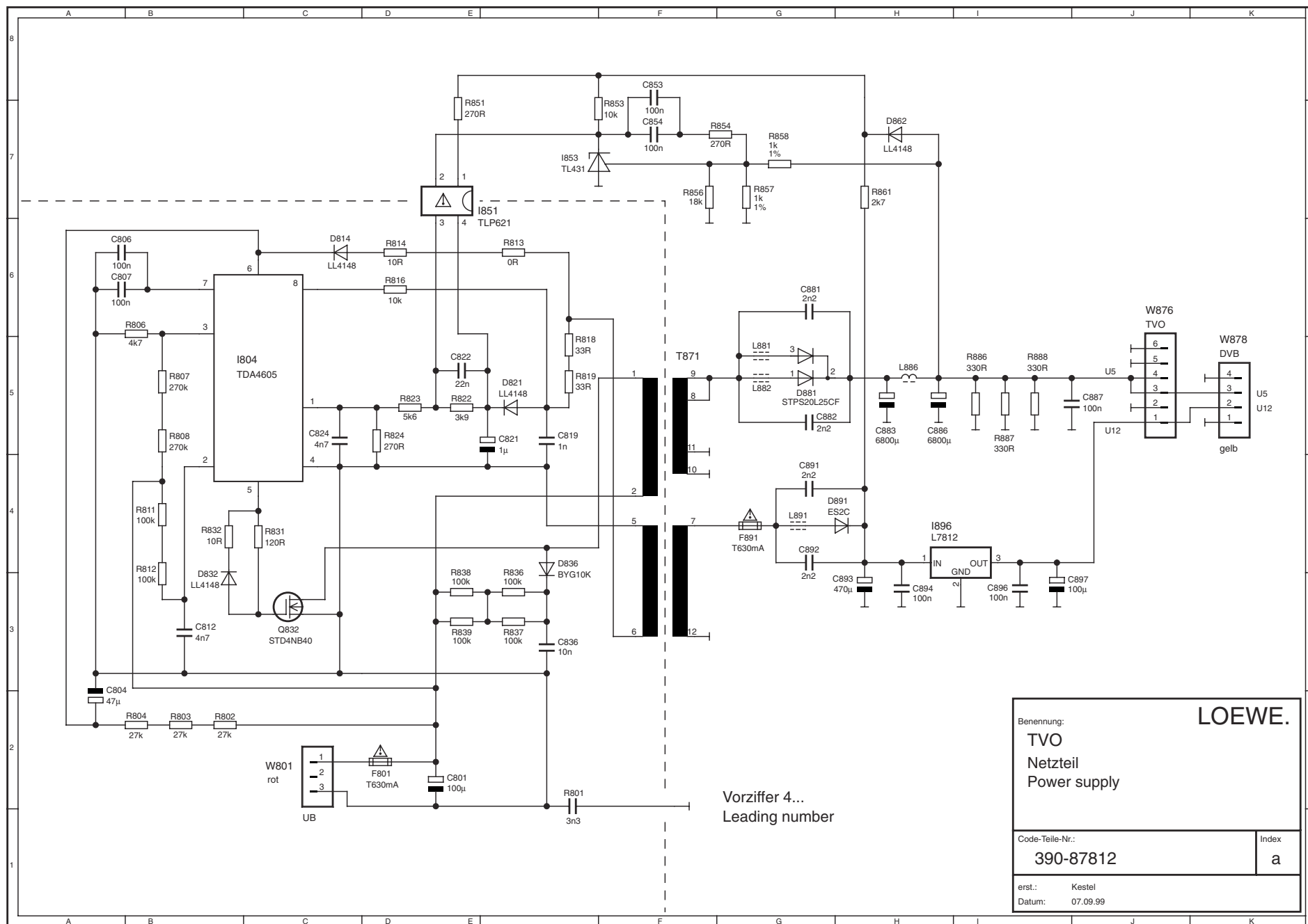
RF Transmitter schematic (2) 88066.001



Ltpl. HF-Sender 88066.001
Bestückungsseite
RF Transmitter P.C.B 88066.001
Components side

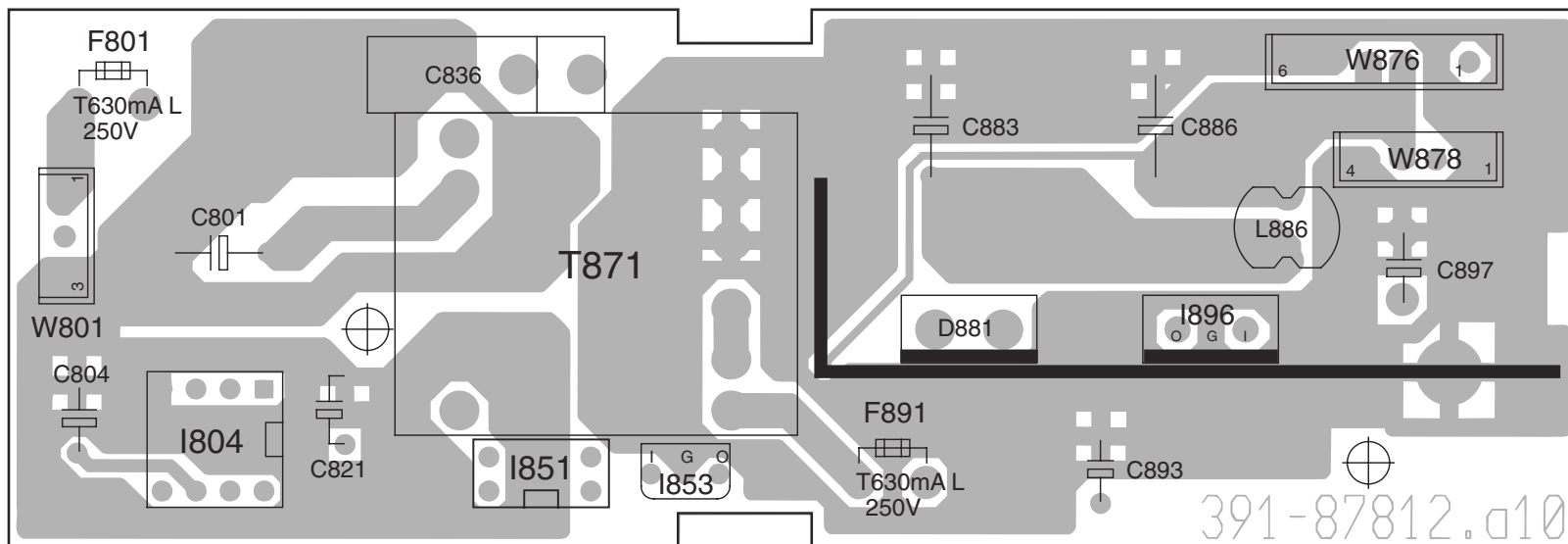


Ltpl. HF-Sender 88066.001
Lötseite
RF Transmitter P.C.B 88066.001
Solder side



Schaltbild Netzteil 390-87812

Power supply schematic diagram 396-87812

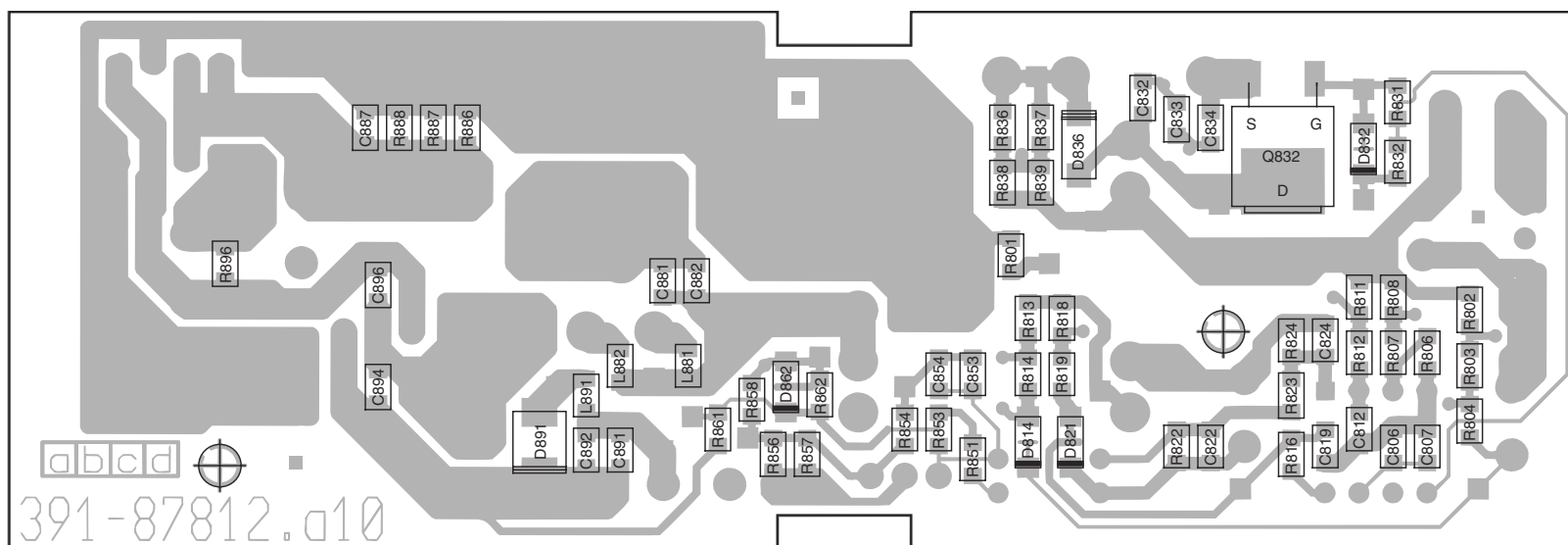


Leiterplatte Netzteil 390-87812

Bestückungsseite

Power supply PCB 390-87812

Components side

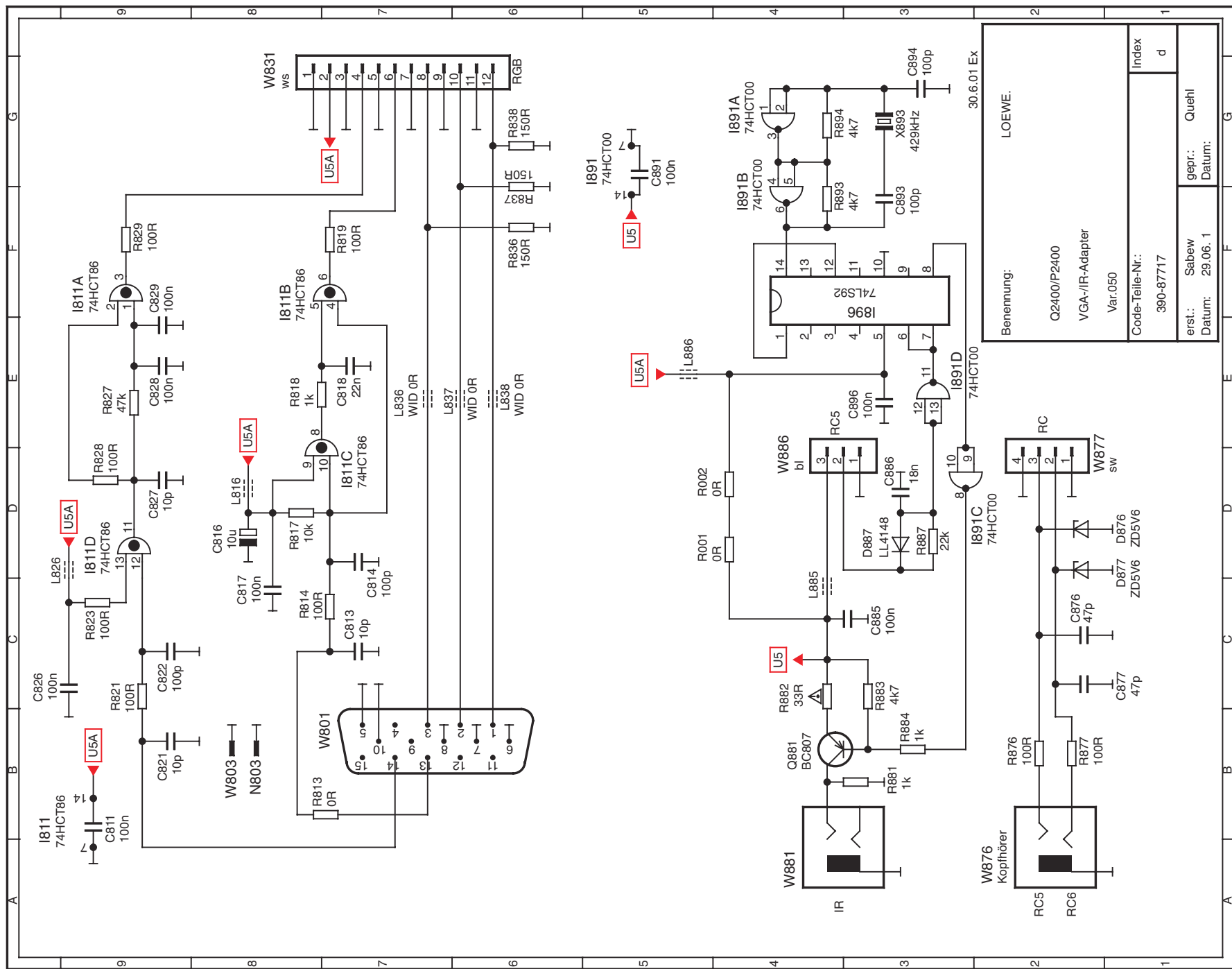


Leiterplatte Netzteil 390-87812

Lötseite

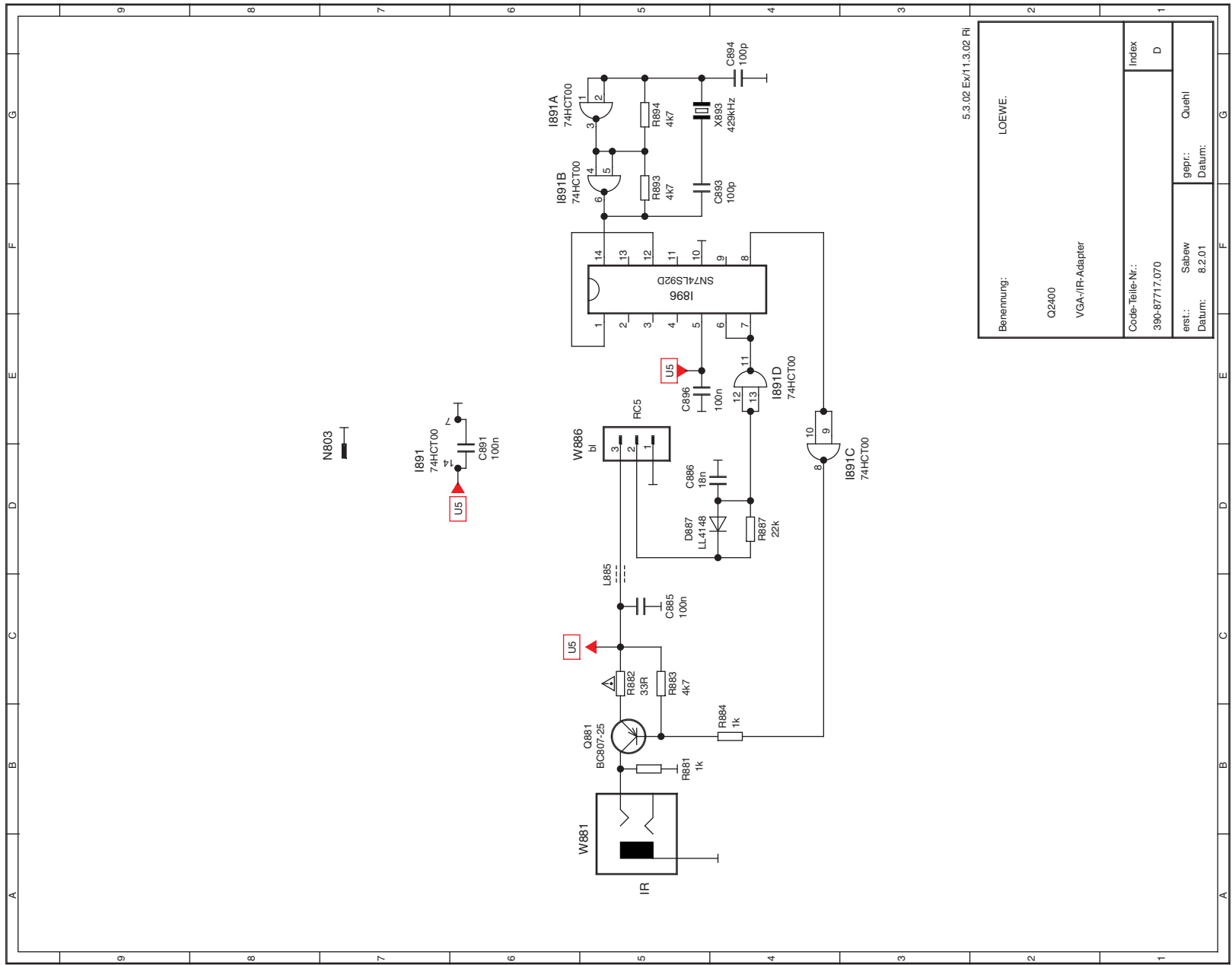
Power supply PCB 390-87812

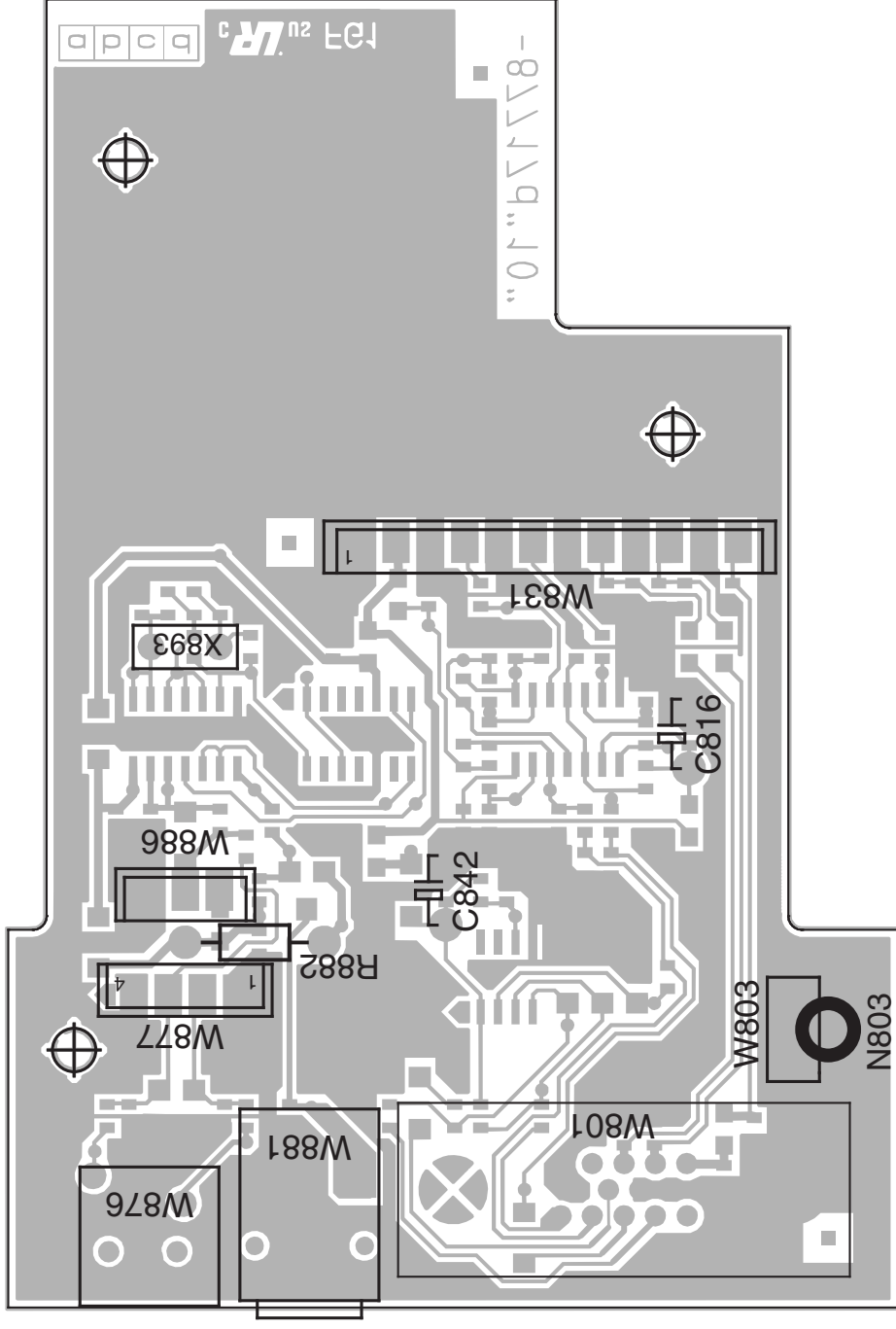
Solder side



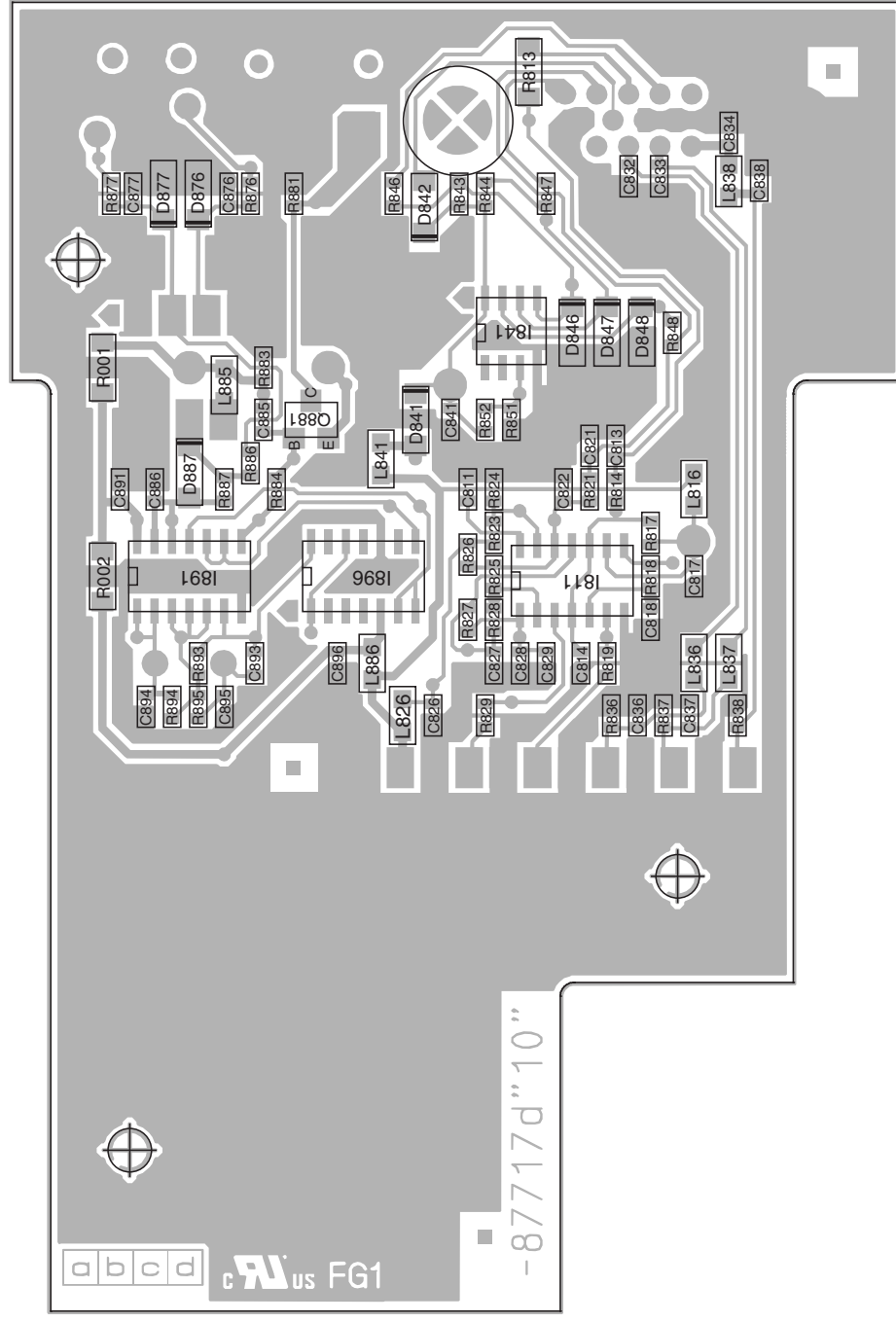
Schaltbild VGA/IR Adapter 87717.050

VGA/IR Adapter schematic 87717.050





Ltpl. VGA/IR-Adapter 87717D Bestückungsseite • VGA/IR Adaptor 87717D Components side



Ltpl. VGA/IR-Adapter 87717D Lötseite • VGA/IR Adaptor 87717D Solder side

Baugruppenübersicht / Components charts

Q 2500 H		H 951	H 650	H 952	H 951	H 051	H 951	H 951	H 454	H 855				Software
		B//G	H/L	H/L	H/L	H/L	R	A/M	A/L	A/L				Farbe
		61401.62	61402.62	61405.52	61405.62	61406.63	61404.63	61450.62	61466.62	61465.62				Art.-Nr
Baugruppen		Aconda 9281 ZW	Aconda 9372 ZP	Aconda 9381 ZW	Aconda 9381 ZW	Aconda 93102 ZW	Aconda 9581 ZW	Articos 32	Xelos 5970 TV-M	Xelos 5981 TV-M				Geräte-Typ
Basic-Board	396-88175...	056	050	055	055	052	055	055	053	054				Baugruppen
Hyperband-Tuner/ZF, Multisystem	260-87271.051	x	x	x	x	x	x	x	x	x				
Hyperband-Tuner/ZF, EPAS	260-87998.050	x	x	x	x	x	x	x	x	x				
Signal-Board	396-88176...	053	053*	053*	053*	054*	054*	053	053	053				
Bedienteil	396-88225...								053	053				
Bedienteil	396-88226...	050	050	050	050	050	050							
Stand-by Netzteil	396-88117.050							x						
Bildrohrplatte	396-87832...		062	062	062		062	062	062	062				
Bildrohrplatte	396-88319...	052				051								
Frequenzweiche	396-85729...	077	072	077	077		077							
IR-Fernbedienung "Control 10/150"	263-87000...	060	060	060	060	060	071**	071						
IR-Fernbedienung "Control MM/D-BOX"	263-87000...								091	091				
EBS VGA Q2500	291-87808.006								x	x				
SAT-6-Nachrüstsatz	291-87809.055	x	x	x	x	x	x	x	x	x				NRS
Twin-SAT-6-Nachrüstsatz	291-87809.056	x	x	x	x	x	x	x	x	x				
DVB1-TV-Decoder-Nachrüstsatz	291-88251.050	x	x		x	x	x	x	x	x				
DVB + Twin-SAT-Nachrüstsatz	291-88251.051	x	x		x	x	x	x	x	x				
TVO 2-Nachrüstsatz	291-87782...	060	060		060	060	060		A/L51	A/L51				
TVO 3-Nachrüstsatz	291-88321...	050	050		050	050	050	050	A/L51	A/L51				
Dolby-Digital AC3 - Nachrüstsatz	291-88308.050	x	x	x	x			x	x	x				
VGA/IR - Nachrüstsatz	291-87808.050	x	x	x	x	x	x	x						
IR-Nachrüstsatz	291-88143.050	x	x	x	x	x								
HF-Sender	291-88035.050	x	x		x	x	x	x						

* gilt ab 30.03.02 bis 29.03.02 Var. 055 (für 61405.52/62) bzw. 056 (für 61406.63)

** gilt ab 06.04.02 bis 05.04.02 Var. 060

Tabelle Basic-Board
Art.-Nr. 88175.050-056

Pos.	Bestell-Nr.	Bestell-Bezeichnung	Varianten:						
			50	51	52	53	54	55	56
B535	85840.001	524 Kurzschlufbrücke (autom.)	1	1	1	1	1	1	
B540	85840.001	524 Kurzschlufbrücke (autom.)							1
B567	85840.001	524 Kurzschlufbrücke (autom.)	1						
B576	85840.001	524 Kurzschlufbrücke (autom.)	1						
B577	85840.001	524 Kurzschlufbrücke (autom.)	1						
B579	85840.001	524 Kurzschlufbrücke (autom.)		1	1	1	1	1	1
C531	25292	Kond. 2N7 J 2000V					1	1	
	25293	Kond. 3N0 J 2000V				1			
	26835	Kond. 2N2 J 2000V	1	1	1				
	28273	Kond. 470P J 2000V							1
C539	24639	Kond. 1N2 J 2000V	1						
	25300	Kond. 3N3 J 2000V			1				
	26372	Kond. 1N8 J 2000V							1
C541	25295	Kond. 9N4 H			1	1			
	25296	Kond. 8N8 H	1			1			
	26619	Kond. 9N1 H		1			1	1	
C542	24450	Kond. 600N J 250V				1	1		
	25886	Kond. 520N J 250V	1	1				1	
	73806	Kond. 900N J 160VW (250 V-)			1				1
C543	26531	Kond. 22N J 630V					1		

Tabelle Basic-Board
Art.-Nr. 88175.050-056

Pos.	Bestell-Nr.	Bestell-Bezeichnung	Varianten:							
			50	51	52	53	54	55	56	
C543	27012	Kond. 25N J 630V	1	1	1	1		1	1	
C544	16573	Kond. 750N J 250V				1				
	25886	Kond. 520N J 250V							1	
	28116	Kond. 680N J 250V		1				1		
	73806	Kond. 900N J 160VW (250 V-)	1		1		1			
C561	11762.020	Elko 22U S 250V	1							
C563	20257.020	Elko 220U M 50V		1	1	1	1	1	1	
C577	12156.020	Kond. 1N5 J 63V	1							
	20455.020	Kond. 1N K 50V		1						
	21367.020	Kond. 2N2 K 50V R5			1	1	1	1	1	
C579	12156.020	Kond. 1N5 J 63V	1							
	20455.020	Kond. 1N K 50V		1						
	23994.020	Kond. 470P K 1000V			1	1	1	1	1	
D532	12657.Y10	Diode 3,0A 40V DO27			1					
	25838.Y10	Diode 3,0A 200V DO201AD UFAST-GP	1	1		1	1	1	1	
D562	31818	Diode 1 N 4148 DO35		1						
D563	31818	Diode 1 N 4148 DO35		1						
H531	25316.050	UG2-Kabel kpl.	1		1	1	1	1	1	
H532	29748	Focus-Kabel 500mm sw	1		1	1	1	1	1	
H533	28954	Hochsp.-Kabel 800mm	1		1	1	1	1	1	

Tabelle Basic-Board
Art.-Nr. 88175.050-056

Pos.	Bestell-Nr.	Bestell-Bezeichnung	Varianten:						
			50	51	52	53	54	55	56
H533	29863	Hochsp.-Kabel 800mm		1					
H535	29749	Focus-Kabel 500mm rot	1		1	1	1	1	1
I561	26528	IC TDA8177		1	1	1	1	1	1
	29150	IC STV9379FA HEPTAWATT Vert.-Ablenkung	1						
L538	24475	Lin.-Regler 4,6uH					1		
	26787	Lin.-Regler		1					1
	27544	Lin.-Regler 5,4uH	1			1		1	
	29392	Lin.-Regler 4,6uH			1				
L553	17664	Dr. 20uH J (10.4.2001 - 29.3.2002)			1				
	22932	Dr. 38U K		1					
	27657	Dr. 44uH J	1			1	1	1	
	29486	Dr. 36uH J							1
	30724.Y06	Dr. 18uH J geschnitten (30.3.2002 - 31.12.2999)			1				
Q534	25708.Y20	Trans. POWBIPO ISOW218 vormontiert	1	1		1	1	1	1
	28864.Y20	Trans. 2SC5302			1				
R532	11093	Wid. 0R56 J 4W			1				
	21294	Wid. 0R68 J 4W	1	1		1	1	1	1
R559	29174.010	33R K 0207 0,33W WIDSI	1						
R564	20661	Wid. 470R J 0207		1					
R570	14985	Wid. 15K G 0204	1		1	1	1	1	1

Tabelle Basic-Board
Art.-Nr. 88175.050-056

Pos.	Bestell-Nr.	Bestell-Bezeichnung	Varianten:						
			50	51	52	53	54	55	56
R570	20331	Wid. 22K G 0204		1					
R574	11091	Wid. 0R82 J 4W		1				1	
	11093	Wid. 0R56 J 4W	1						
	21294	Wid. 0R68 J 4W			1				
	22719	Wid. 1R J 2W				1	1		1
R577	77101	Wid. 10R J 0207		1					
R619	16662	DUO-PTC-Wid. 18R				1			1
	28729	DUO-PTC-Wid. 9R	1	1	1		1	1	
R659	14985	Wid. 15K G 0204		1					
	20328	Wid. 47K J 0204							1
	20331	Wid. 22K G 0204	1		1	1	1	1	
T531	28670	Zeilentrafo 32" Q24/25		1					
	29176	Zeilentrafo 28/29/32/40"Q25	1		1	1	1	1	
	30744	Zeilentrafo 32" Q2500							1
T639	28636	W-Trafo Q2400/Q2500 (146V)		1					
	28640	W-Trafo Q2400 (136V)	1		1	1	1	1	
	29751	W-Trafo Q2400 (120V) 32"							1
W545	82232.001	Flachstecker,gebogen "UG 2"		1					

Basic Board Q2500 (H)

Art.-Nr. 88175.050-056

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BAUGRUPPEN		UNITS		
U202	Tuner-ZF M Multisystem MN/BG-DK	Tuner	260-87271.051	
U203	Tuner-ZF EPAS Eurosys. m. Antennenspl.	Tuner	260-87998.050	
SPULEN/LAUTSPRECHER		COILS,SPEAKERS		
L202	Dr. 47uH K SMCC Fastron	Choke	298-16925	
L203	Dr. 4330 030 38100 VAL	Choke	298-14399	
L533	Fe-Dr. 0U7 6x5	Choke	298-27471.Y03	
L534	Dr. 150U K 10x15	Choke	298-79726.020	
L538	Lin.-Regler 4,6uH	Deflection Unit	278-24475	054
L538	Lin.-Regler	Deflection Unit	278-26787	055
L538	Lin.-Regler	Deflection Unit	278-26787	056
L538	Lin.-Regler 5,4uH	Deflection Unit	278-27544	050
L538	Lin.-Regler 5,4uH	Deflection Unit	278-27544	053
L538	Lin.-Regler 4,6uH	Deflection Unit	278-29392	052
L619	Dr. 820uH	Choke	298-28785	
T528	Spule Treiberspule	Coil	297-23664	
T531	Zeilentrafo 28/32/40" Q2500	Line Transformer	276-29176	050
T531	Zeilentrafo 28/32/40" Q2500	Line Transformer	276-29176	052
T531	Zeilentrafo 28/32/40" Q2500	Line Transformer	276-29176	053
T531	Zeilentrafo 28/29/32/40" Q25	Line Transformer	276-29176	054
T531	Zeilentrafo 28/32/40" Q2500	Line Transformer	276-29176	055
T531	Zeilentrafo 32" Q2500	Line Transformer	276-30744	056
T540	Trafo AT 4043/67A	Power Transformer	490-21351	
T612	Dr. 2x 18mH5	Choke	298-17684	
T639	W-Trafo Q2400 (136V)	Power Transformer	490-28640	050
T639	W-Trafo Q2400 (136V)	Power Transformer	490-28640	052
T639	W-Trafo Q2400 (136V)	Power Transformer	490-28640	053
T639	W-Trafo Q2400 (136V)	Power Transformer	490-28640	054
T639	W-Trafo Q2400 (136V)	Power Transformer	490-28640	055
T639	W-Trafo Q2400 (120V) 32"	Power Transformer	490-29751	056
ALLGEM. MECHAN. TEILE		COMMON MECHANICAL PARTS		
20	Aufsteckkühlkörper	Screening	509-27369	
30	Linsenschraube AM 3x10 brüniert	Screw	432-74571	050
30	Linsenschraube AM 3x10 brüniert	Screw	432-74571	052
30	Linsenschraube AM 3x10 brüniert	Screw	432-74571	055
H 01	Sicherungshalter für SI 5x20	Fuseholder Spring	730-20061	
H 02	Sicherungshalter für SI 5x20	Fuseholder Spring	730-20061	

Basic Board Q2500 (H)

Art.-Nr. 88175.050-056

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
ALLGEM. MECHAN. TEILE		COMMON MECHANICAL PARTS		
H474	Montageclip	Spring	739-87529.001	
H484	Montageclip	Spring	739-87529.001	
H534	Montageclip	Spring	739-87529.001	
H539	Montageclip	Spring	739-87529.001	
H560	Montageclip	Spring	739-87529.001	
H561	Montageclip	Spring	739-87529.001	
H562	Glimmerscheibe 16x21	Insulating Piece	421-10881	
H586	Montageclip	Spring	739-87529.001	
H587	Glimmerscheibe 16x21	Insulating Piece	421-10881	
H621	Kabelhalter	Cable Binding	530-29601	
H623	Montageclip	Spring	739-87529.001	
H624	Montageclip	Spring	739-87529.001	
H625	Glimmerscheibe 16x21	Insulating Piece	421-10881	
H652	Montageclip	Spring	739-87529.001	
H663	Montageclip	Spring	739-87529.001	
H671	Montageclip	Spring	739-87529.001	
H674	Montageclip	Spring	739-87529.001	
INTEGR. SCHALTUNGEN		INTEGRATED CIRCUITS		
10	L 7808 ACV	Integrated Circuit	349-21780.Y20	
10	L 78S09CV geschnitten	Integrated Circuit	349-24013.Y18	
I474	TDA 7296	Integrated Circuit	349-28414	
I484	TDA 7296	Integrated Circuit	349-28414	
I561	TDA8177	Integrated Circuit	349-26528	052
I561	TDA8177	Integrated Circuit	349-26528	053
I561	TDA8177	Integrated Circuit	349-26528	054
I561	TDA8177	Integrated Circuit	349-26528	055
I561	TDA8177	Integrated Circuit	349-26528	056
I561	STV9379FA Vert. Ablenkung	Integrated Circuit	349-29150	050
I569	TL 431ACLP	Integrated Circuit	349-19817.020	
I611	TDA4605-3/TDA4605	Integrated Circuit	349-22113	
I663	L 7808ACV vormontiert	Integrated Circuit	349-21780.050	
I669	Opto-Koppler DIP4 80V 50/80mA	Coupler	353-28638	
I670	TL 431ACLP	Integrated Circuit	349-19817.020	
I674	TL 431ACLP	Integrated Circuit	349-19817.020	
I676	TL 431ACLP	Integrated Circuit	349-19817.020	
I691	L 78S09CV vormontiert	Integrated Circuit	349-24013.051	

Basic Board Q2500 (H)
Art.-Nr. 88175.050-056

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	TRANSISTOREN	TRANSISTORS		
10	SILPOW TO220FP PNP 80V 3A 24W	Transistor	346-28633	
10	2SC5302 ISOW218 NPN 1500V 10A 50W	Transistor	346-28864	052
Q469	BC547B TO92	Transistor	346-74983.020	055
Q526	SILPLAN TO92 NPN 100V 2A 1W	Transistor	346-20796.020	
Q531	ZTX712 E-Line	Transistor	346-27659.020	
Q532	ZTX614 E-Line	Transistor	346-27660.020	
Q533	BF422 TO92	Transistor	346-11562.020	
Q534	POWBIPO ISOW218 vormontiert	Transistor	346-25708.Y20	050
Q534	POWBIPO ISOW218 vormontiert	Transistor	346-25708.Y20	053
Q534	POWBIPO ISOW218 vormontiert	Transistor	346-25708.Y20	054
Q534	POWBIPO ISOW218 vormontiert	Transistor	346-25708.Y20	055
Q534	POWBIPO ISOW218 vormontiert	Transistor	346-25708.Y20	056
Q534	2SC5302	Transistor	346-28864.Y20	052
Q562	POWMOS TO220FP NCH 50V 10A 30W	Transistor	346-18528	
Q582	BC556B	Transistor	346-74967.020	
Q585	BC547B TO92	Transistor	346-74983.020	
Q586	BD537 TO220A	Transistor	346-77764	
Q589	BC557B	Transistor	346-74878.020	
Q593	BC557B	Transistor	346-74878.020	
Q596	BC556B	Transistor	346-74967.020	
Q597	BC547B TO92	Transistor	346-74983.020	
Q624	POWMOS TO220 NCH 600V 8A	Transistor	346-28957	
Q663	POWMOS TO220FP NCH 50V 10A 30W	Transistor	346-18528	
Q674	POWMOS TO220FP NCH 50V 10A 30W	Transistor	346-18528	
Q681	BC557B	Transistor	346-74878.020	
Q682	SILPOW TO220FP PNP 80V 3A 24W	Transistor	346-28633.Y22	
	DIODEN	DIODES		
10	3,0A 40V DO27 Schottky	Diode	352-12657	
10	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.010	
10	10,0A 200V ISOWATT220AC	Diode	352-28625	
10	10,0A 200V geschnitten	Diode	352-28625.Y20	
10	3,0A 300V DO201AD UFAST-GP	Diode	352-29726	
D206	ZD 30V0 2%	Diode	352-15763	
D474	1 N 4148 DO35	Diode	352-31818	
D491	1 N 4148 DO35	Diode	352-31818	
D526	1 N 4148 DO35	Diode	352-31818	

Basic Board Q2500 (H)
Art.-Nr. 88175.050-056

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	DIODEN	DIODES		
D527	EU 02V0	Diode	352-20289	
D531	1,0A 400V DO41 FAST-GP	Diode	352-20685	
D532	3,0A 40V DO27	Diode	352-12657.Y10	052
D532	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	050
D532	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	053
D532	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	054
D532	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	055
D532	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	056
D533	BA 157	Diode	352-44799	
D537	3,0A 40V DO27	Diode	352-12657.Y10	
D539	ESC011M	Diode	352-23667	
D541	BA 157	Diode	352-44799	
D546	BA 157	Diode	352-44799	
D547	BA 159	Diode	352-49148	
D548	1 N 4148 DO35	Diode	352-31818	
D549	ZD 30V0 2%	Diode	352-15763	
D557	1,0A 400V DO41 FAST-GP	Diode	352-20685	
D558	1,0A 400V DO41 FAST-GP	Diode	352-20685	
D561	BA 157	Diode	352-44799	
D569	ZD 12V0	Diode	352-44202	
D584	ZD 30V0 2%	Diode	352-15763	
D589	BA 157	Diode	352-44799	
D590	BA 157	Diode	352-44799	
D613	Gleichrichter B250 C3200/2200	Rectifier	354-22394	
D617	3,0A 1000V DO27A UFAST-GP	Diode	352-22712	
D622	BA 157	Diode	352-44799	
D623	STTA506F TO220	Diode	352-27866	
D636	BA 157	Diode	352-44799	
D652	BYT08PI-1000	Diode	352-28613	
D656	3,0A 300V DO201AD UFAST-GP	Diode	352-29726.Y10	
D660	ZD 12V0	Diode	352-44202	
D663	10,0A 200V vormontiert BYW-80	Diode	352-28625.050	
D666	0,5A 20V DO-35 SD103C	Diode	352-17741	
D670	ZD 30V0 2%	Diode	352-15763	
D671	STPS20L40CF ISOWATT220AB 2x10A	Diode	352-20296	
D672	ZD 3V9 DO35 5% 0,5W	Diode	352-10526	

Basic Board Q2500 (H)**Art.-Nr. 88175.050-056**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
DIODEN		DIODES		
D680	ZD 100V0 DO-41 J 1,3W ZPY	Diode	352-28686	
D681	BA 157	Diode	352-44799	
D686	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	
D687	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	
POTENTIOMETER		POTENTIOMETERS		
P662	1K	Potentiometer	375-22863.020	
SICHERUNGEN		FUSES		
F611	3150mA T 250V 5x20 H	Fuse	380-29649	
F656	3150mA F 250V 8x8	Fuse	380-26219.020	
F661	4000mA T 250V 8x8	Fuse	380-13809.020	
F672	5000mA T 250V 8x8	Fuse	380-27665.020	
F689	630mA T 250V 8x8	Fuse	380-13837.020	
KONDENSATOREN		CAPACITORS		
C531	2N7 J 2000V	Capacitor	359-25292	054
C531	2N7 J 2000V	Capacitor	359-25292	055
C531	3N0 J 2000V	Capacitor	359-25293	053
C531	2N2 J 2000V	Capacitor	359-26835	050
C531	2N2 J 2000V	Capacitor	359-26835	052
C531	470P J 2000V	Capacitor	359-28273	056
C538	Elko 47U M 250V	Electrolytic Capacitor	360-22941	
C539	1N2 J 2000V	Capacitor	359-24639	050
C539	3N3 J 2000V	Capacitor	359-25300	052
C539	1N8 J 2000V	Capacitor	359-26372	056
C540	Elko 2U2 M 350V	Electrolytic Capacitor	360-28102.020	
C541	9N4 H	Capacitor	359-25295	052
C541	9N4 H	Capacitor	359-25295	056
C541	8N8 H	Capacitor	359-25296	050
C541	8N8 H	Capacitor	359-25296	053
C541	8N8 H	Capacitor	359-25296	055
C541	9N1 H	Capacitor	359-26619	054
C542	600N J 250V	Capacitor	359-24450	053
C542	600N J 250V	Capacitor	359-24450	054
C542	520N J 250V	Capacitor	359-25886	050
C542	520N J 250V	Capacitor	359-25886	055
C542	900N J 160VW (250 V-)	Capacitor	359-73806	052
C542	900N J 160VW (250 V-)	Capacitor	359-73806	056

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
KONDENSATOREN		CAPACITORS		
C543	22N J 630V	Capacitor	359-26531	054
C543	25N J 630V	Capacitor	359-27012	050
C543	25N J 630V	Capacitor	359-27012	052
C543	25N J 630V	Capacitor	359-27012	053
C543	25N J 630V	Capacitor	359-27012	055
C543	25N J 630V	Capacitor	359-27012	056
C544	750N J 250V	Capacitor	359-16573	053
C544	520N J 250V	Capacitor	359-25886	056
C544	680N J 250V	Capacitor	359-28116	055
C544	900N J 160VW (250 V-)	Capacitor	359-73806	050
C544	900N J 160VW (250 V-)	Capacitor	359-73806	052
C544	900N J 160VW (250 V-)	Capacitor	359-73806	054
C545	390P J 2000V	Capacitor	359-28868	
C546	470P K 1000V	Capacitor	357-23994.020	
C548	Elko 22U S 250V	Electrolytic Capacitor	360-11762.020	
C553	390P J 2000V	Capacitor	359-28868	
C561	Elko 22U S 250V	Electrolytic Capacitor	360-11762.020	050
C568	470N J 100V	Capacitor	359-28078.020	
C579	470P K 1000V	Capacitor	357-23994.020	052
C579	470P K 1000V	Capacitor	357-23994.020	053
C579	470P K 1000V	Capacitor	357-23994.020	054
C579	470P K 1000V	Capacitor	357-23994.020	055
C579	470P K 1000V	Capacitor	357-23994.020	056
C611	470N M 275VW	Capacitor	359-28292	
C612	KOFOL 470N M 310VW	Capacitor	359-29681	
C613	KOFOL 470N M 310VW	Capacitor	359-29681	
C614	KO-Y1 1N0 M 250V	Capacitor	357-29162	
C619	100N M 250VW	Capacitor	359-23372	
C620	Elko 330U M 450V	Electrolytic Capacitor	360-27891	
C621	470N J 100V	Capacitor	359-28078.020	
C624	820P J 2000V	Capacitor	359-26529	
C627	150P K 1600V	Capacitor	359-13943	
C628	22N J 630V	Capacitor	359-26531	
C630	100P K 500V	Capacitor	357-20272.020	
C639	KO-Y1 1N5 M 250V	Capacitor	357-29161	
C650	150P K 1600V	Capacitor	359-13943	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
KONDENSATOREN		CAPACITORS		
C651	Elko 47U M 250V	Electrolytic Capacitor	360-22941	
C682	680P K 500V	Capacitor	357-21183.020	
C689	680P K 500V	Capacitor	357-21183.020	
WIDERSTÄNDE		RESISTORS		
10	0R1 K 0207 WIDSI	Resistor	366-10905	
R206	6K8 J 0207	Resistor	366-20652	
R207	5K6 J 0207	Resistor	366-28964	
R208	6K8 J 0207	Resistor	366-20652	
R209	5K6 J 0207	Resistor	366-28964	
R466	470R J 0617 3,00W	Resistor	367-20648	
R468	470R J 0617 3,00W	Resistor	367-20648	
R475	4R7 K 0207 WIDSI	Resistor	366-18416	
R477	10K F 0204	Resistor	367-20347	
R479	220R J 0207	Resistor	366-15679	
R485	4R7 K 0207 WIDSI	Resistor	366-18416	
R489	220R J 0207	Resistor	366-15679	
R491	3R3 K 0207 0,33W WIDSI	Resistor	366-11790	
R516	22R J 0207	Resistor	366-20655	
R517	22R J 0207	Resistor	366-20655	
R518	10R J 0207	Resistor	366-77101	
R521	3R3 K 0207 0,33W WIDSI	Resistor	366-11790	
R524	4K7 J 0207	Resistor	366-40343	
R525	4K7 J 0207	Resistor	366-40343	
R527	4K7 J 0207	Resistor	366-40343	
R528	4K7 J 0207	Resistor	366-40343	
R529	4K7 J 0207	Resistor	366-40343	
R530	4K7 J 0207	Resistor	366-40343	
R531	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	
R532	0R56 J 4W	Resistor	368-11093	052
R532	0R68 J 4,00W	Resistor	368-21294	050
R532	0R68 J 4,00W	Resistor	368-21294	053
R532	0R68 J 4,00W	Resistor	368-21294	054
R532	0R68 K 4,00W	Resistor	368-21294	055
R532	0R68 J 4,00W	Resistor	368-21294	056
R533	12R F 0207	Resistor	367-21330	
R534	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
WIDERSTÄNDE		RESISTORS		
R535	100K J 0207	Resistor	366-16330	
R536	10K F 0204	Resistor	367-20347	
R537	10K F 0204	Resistor	367-20347	
R538	100K J 0207	Resistor	366-16330	
R539	100K J 0207	Resistor	366-16330	
R540	47R J 0411 0,75W WIDSI	Resistor	368-28118	
R541	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	
R542	1K8 G 0204	Resistor	367-20334	
R543	1K5 J 0414 1W	Resistor	367-20657	
R544	2K2 K 0W5 0411 WIDM	Resistor	367-29791	
R545	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	
R546	220R J 0207	Resistor	366-15679	
R547	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	
R549	150K G 0207	Resistor	367-10898	
R551	150K G 0207	Resistor	367-10898	
R553	220R J 0207	Resistor	366-15679	
R555	1K2 F 0204	Resistor	367-17324	
R557	1R0 J 0207 0,5W WIDSI	Resistor	366-28909	
R558	1R0 J 0207 0,5W WIDSI	Resistor	366-28909	
R559	33R K 0207 0,33W WIDSI	Resistor	367-29174.010	050
R560	10K F 0204	Resistor	367-20347	
R561	3K9 F 0204	Resistor	367-20341	
R563	470R J 0207	Resistor	366-20661	
R565	39K F 0204	Resistor	367-28894	
R566	82K G 0207	Resistor	367-10885	
R567	470R J 0207	Resistor	366-20661	
R569	470R J 0207	Resistor	366-20661	
R570	15K G 0204	Resistor	367-14985	
R571	5K6 G 0204	Resistor	367-20343	
R572	5K6 G 0204	Resistor	367-20343	
R573	4K7 J 0207	Resistor	366-40343	
R574	0R82 K 4,00W	Resistor	368-11091	055
R574	0R56 J 4W0	Resistor	368-11093	050
R574	0R68 J 4,00W	Resistor	368-21294	052
R574	1R J 2,00W	Resistor	368-22719	053
R574	1R J 2,00W	Resistor	368-22719	054

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	WIDERSTÄNDE	RESISTORS		
R574	1R J 2,00W	Resistor	368-22719	056
R578	82K G 0207	Resistor	367-10885	
R579	39K F 0204	Resistor	367-28894	
R581	10K F 0204	Resistor	367-20347	
R582	10K F 0204	Resistor	367-20347	
R583	220K F 0207	Resistor	367-28413	
R587	4K7 F 0204	Resistor	367-20346	
R588	10K F 0204	Resistor	367-20347	
R589	10K F 0204	Resistor	367-20347	
R590	10R J 0207	Resistor	366-77101	
R591	1R J 0207	Resistor	366-20649	
R592	1R J 0207	Resistor	366-20649	
R593	10R J 0207	Resistor	366-77101	
R594	1R K 0207 WIDSI	Resistor	366-12276	
R596	100K J 0207	Resistor	366-16330	
R598	100K J 0207	Resistor	366-16330	
R613	1R5 K 7,00W	Resistor	368-24602	
R619	DUO-PTC-Wid. 18R	PTC Resistor	372-16662	053
R619	DUO-PTC-Wid. 18R	PTC Resistor	372-16662	056
R619	DUO-PTC-Wid. 9R	PTC Resistor	372-28729	050
R619	DUO-PTC-Wid. 9R	PTC Resistor	372-28729	052
R619	DUO-PTC-Wid. 9R	PTC Resistor	372-28729	054
R619	DUO-PTC-Wid. 9R	PTC Resistor	372-28729	055
R621	56K J 0414 1,00W	Resistor	367-22396	
R622	820K J 0207	Resistor	366-16437	
R623	4K7 F 0204	Resistor	367-20346	
R625	680K J 0207	Resistor	367-27264	
R626	22R J 0207	Resistor	366-20655	
R627	10K F 0204	Resistor	367-20347	
R629	22R J 0207	Resistor	366-20655	
R634	680K J 0207	Resistor	367-27264	
R639	10M J 0414	Resistor	367-19664	
R651	18K G 0207	Resistor	367-11559	
R652	1R K 0207 WIDSI	Resistor	366-12276	
R653	100R J 0207	Resistor	366-73257	
R654	100R J 0207	Resistor	366-73257	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	WIDERSTÄNDE	RESISTORS		
R657	4K7 F 0204	Resistor	367-20346	
R658	4K7 F 0204	Resistor	367-20346	
R659	22K G 0204	Resistor	367-20331	050
R659	22K G 0204	Resistor	367-20331	052
R659	22K G 0204	Resistor	367-20331	053
R659	22K G 0204	Resistor	367-20331	054
R659	22K G 0204	Resistor	367-20331	055
R660	4K7 F 0204	Resistor	367-20346	
R661	4K7 F 0204	Resistor	367-20346	
R662	4K7 F 0204	Resistor	367-20346	
R663	220K F 0207	Resistor	367-28413	
R665	56K J 0414 1,00W	Resistor	367-22396	
R666	18K F 0204	Resistor	367-18527	
R668	4K7 F 0204	Resistor	367-20346	
R677	10K F 0204	Resistor	367-20347	
R678	10K F 0204	Resistor	367-20347	
R679	100K J 0207	Resistor	366-16330	
R681	3R3 J 0207	Resistor	366-77754	
R682	33R J 0207	Resistor	366-22944	
R683	470R J 0207	Resistor	366-20661	
R684	6K8 J 0207	Resistor	366-20652	
R685	68R J 3,00W	Resistor	367-22942	
R686	0R1 K 0207 WIDSI	Resistor	366-10905Y09	
R687	0R1 K 0207 WIDSI	Resistor	366-10905Y09	
R688	1R J 0207	Resistor	366-20649	
R689	1R J 0207	Resistor	366-20649	
R690	1R K 0207 WIDSI	Resistor	366-12276	
R691	100R J 0207	Resistor	366-73257	
R692	100R J 0207	Resistor	366-73257	
R693	220R J 0207	Resistor	366-15679	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BAUGRUPPEN		UNITS		
20	AC3-Modul kpl. Q2500	P.C.B	396-88228.050	054
20	AC3-Modul kpl. Q2500	P.C.B	396-88228.050	056
30	Audio-Erweiterung kpl. Q2500	P.C.B	396-88234.050	054
30	Audio-Erweiterung kpl. Q2500	P.C.B	396-88234.050	056
INTEGR. SCHALTUNGEN		INTEGRATED CIRCUITS		
10	ICMOS M27V322-100XB1 100ns OTP	Integrated Circuit	349-29779	054
10	ICMOS M27V322-100XB1 100ns OTP	Integrated Circuit	349-29779	055
10	ICMOS M27V322-100XB1 100ns OTP	Integrated Circuit	349-29779	056
10	ICMOS OTP VSOP32 256Kx8	Integrated Circuit	350-28694	054
I 01	ICMOS CS4925 PLCC44	Integrated Circuit	350-28692	054
I 02	ICMOS CS4226 TQFP44	Integrated Circuit	350-28693	054
I 03	ICMOS 74LVC574APW TSOP20	Integrated Circuit	350-28695	054
I 04	ICMOS 74LVC574APW TSOP20	Integrated Circuit	350-28695	054
I 05	ICMOS OTP VSOP32 256Kx8 SW V1.0	Integrated Circuit	350-28694.050	054
I 06	ICMOS SSM2404 SO20	Integrated Circuit	350-28699	054
I 07	MC33079 SO14	Integrated Circuit	350-28701	054
I 08	MC33079 SO14	Integrated Circuit	350-28701	054
I 09	ICMOS HEF4053D SO16	Integrated Circuit	350-24881	054
I 10	ICMOS M34063A SO008	Integrated Circuit	350-28429	054
I 11	ICMOS 8575 SOT340 I/O-EXP.J2C	Integrated Circuit	350-29252	054
I 12	MC33078 SO8	Integrated Circuit	350-28702	054
I 13	ICMOS HCF4081B SO14	Integrated Circuit	350-28689	054
I 14	ICMOS SSM2404 SO20	Integrated Circuit	350-28699	054
I 15	ICMOS 74LVC125APW TSSOP14	Integrated Circuit	350-28697	054
I 16	ICMOS 74LVC14APW TSSOP14	Integrated Circuit	350-28748	054
I 18	NJM2234 SSOP-8 VIDEO-SWITCH	Integrated Circuit	350-29253	054
I1631	ICMOS HEF4053D SO16	Integrated Circuit	350-24881	
I1711	TEA6415 SO20L	Integrated Circuit	350-25733	
I1731	TEA6415 SO20L	Integrated Circuit	350-25733	
I1771	ICMOS HEF4053D SO16	Integrated Circuit	350-24881	
I1851	TEA6420D SO28	Integrated Circuit	350-28564	
I1871	TEA6422D SO28	Integrated Circuit	350-25732	
I2051	ICMOS MSP3411 PQFP-80 SOUND	Integrated Circuit	350-29132	
I2056	MC 78L08ACP TO92	Integrated Circuit	349-24725.020	
I2091	MC33079 SO14	Integrated Circuit	350-28701	
I2151	ICMOS VPC3233 QFP80	Integrated Circuit	350-28573	

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INTEGR. SCHALTUNGEN		INTEGRATED CIRCUITS		
I2161	ICMOS SAA4955HL LQFP44	Integrated Circuit	350-28823	
I2171	ICMOS SAA4955HL LQFP44	Integrated Circuit	350-28823	
I2192	ICMOS 74LVC08 SO14 AND	Integrated Circuit	350-27928	
I2193	ICMOS 74LVC00A D SO14	Integrated Circuit	350-28990	
I2271	ICMOS VPC3230D MQFP80	Integrated Circuit	350-29177	
I2311	ICMOS SAA4979 QFP128 CONVER	Integrated Circuit	350-29128	
I2318	IC-VR 3V30 0A30 SOT223	Integrated Circuit	350-29462	
I2361	ICMOS 74LV00 D SO14	Integrated Circuit	350-28730	
I2411	IC-VR 2V50 0A50 SOT223	Integrated Circuit	350-29461	
I2421	ICMOS SAA4993 QFP160 FALCON	Integrated Circuit	350-29233	
I2451	ICMOS SAA4955HL LQFP44	Integrated Circuit	350-28823	
I2461	ICMOS SAA4955HL LQFP44	Integrated Circuit	350-28823	
I2521	TDA9332H-N2 QFP-44 DEFLEC	Integrated Circuit	350-29481	055
I2521	TDA9332H-N2 QFP-44 DEFLEC	Integrated Circuit	350-29481	056
I2521	TDA9332H-N3 QFP-44 DEFLEC	Integrated Circuit	350-29801	053
I2521	TDA9332H-N3D QFP-44 DEFLEC	Integrated Circuit	350-29833	054
I2651	LM 358 SMD	Integrated Circuit	350-21521	
I2716	ICMOS 74HCT4052D SO16	Integrated Circuit	350-29463	
I2786	IC-VR 3V30 0A30 SOT223	Integrated Circuit	350-29462	
I2791	IC-VR 2V50 0A30 SOT223	Integrated Circuit	350-29460	
I2796	IC-VR 2V50 0A30 SOT223	Integrated Circuit	350-29460	
I2801	ICMOS SDA6000 MQFP128 TELTEX	Integrated Circuit	350-29127	
I2916	ICMOS 48LC4M# TSOP2 10ns SDRAM	Integrated Circuit	350-29137	
I2926	ICMOS M27V322-100XB1 100ns OTP	Integrated Circuit	349-29779	053
I2926	ICMOS M27V322-100XB1OTP SW V2.2	Integrated Circuit	349-29779.489	056
I2926	ICMOS M27V322-100XB1OTP SW V2.3	Integrated Circuit	349-29779.492	055
I2926	ICMOS M27V322-100XB1OTP SW V2.6	Integrated Circuit	349-29779.513	054
I2931	ICMOS 24C64 DIP-8 EEPROM 64KB I2C	Integrated Circuit	349-28114	
I2936	ICMOS 24256 DIP-8 256K EEPROM I2C	Integrated Circuit	349-29262	053
I2941	ICRES 2V75 J SO8 TS831	Integrated Circuit	350-29141	
I2946	ICRES 2V75 J SO8 TS831	Integrated Circuit	350-29141	
BUCHSEN/FASSUNGEN		SOCKETS		
H2926	IC-Fassung 42-pol. DIL	Socket	320-28410	
H2931	IC-Fassung 8-pol.	Socket	320-80503	
H2936	IC-Fassung 8-pol.	Socket	320-80503	
W 01	Cinchbuchse 4-fach quadratisch	Socket	323-29242	054

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BUCHSEN/FASSUNGEN		SOCKETS		
W 03	Cinchbuchsenleiste 3-fach schwarz	Socket	323-29664	054
W1101	SCART-Buchse	Socket	323-19542	
W1201	SCART-Buchse	Socket	323-19542	
W1301	SCART-Buchse	Socket	323-19542	
W1411	Kopfhörerbuchse Stereo	Socket	323-27782	
W1494	Cinchbuchse 2-fach vertikal rot/weiß	Socket	323-28893	
W1551	Connector 9-pol.	Contact Ledge	326-24474	
W1941	Buchse vertikal Mini DIN 8polig	Socket	323-28368	
W1961	Mini-DIN-Buchse 9-pol. stehend	Socket	323-29229	
TRANSISTOREN		TRANSISTORS		
Q1142	BC847BW SOT323	Transistor	344-27272	
Q1152	BC857BW SOT323	Transistor	344-28404	
Q1161	BC817-25W SOT323	Transistor	344-28405	
Q1252	BC857BW SOT323	Transistor	344-28404	
Q1261	BC817-25W SOT323	Transistor	344-28405	
Q1432	BCW66H	Transistor	344-26051	
Q1433	BC857BW SOT323	Transistor	344-28404	
Q1446	BC857BW SOT323	Transistor	344-28404	
Q1453	BC847BW SOT323	Transistor	344-27272	
Q1461	BC847BW SOT323	Transistor	344-27272	
Q1473	BC847BW SOT323	Transistor	344-27272	
Q1483	BC857BW SOT323	Transistor	344-28404	
Q1491	BC847BW SOT323	Transistor	344-27272	
Q1493	BC847BW SOT323	Transistor	344-27272	
Q1496	BC847BW SOT323	Transistor	344-27272	
Q1498	BC847BW SOT323	Transistor	344-27272	
Q1581	BC847BW SOT323	Transistor	344-27272	
Q1586	BC847BW SOT323	Transistor	344-27272	
Q1773	BC847BW SOT323	Transistor	344-27272	
Q1776	BC857BW SOT323	Transistor	344-28404	
Q1782	BC857BW SOT323	Transistor	344-28404	
Q1784	BC857BW SOT323	Transistor	344-28404	
Q1792	BC847BW SOT323	Transistor	344-27272	
Q1814	BC847BW SOT323	Transistor	344-27272	
Q1834	BC847BW SOT323	Transistor	344-27272	
Q1849	BC847BW SOT323	Transistor	344-27272	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
TRANSISTOREN		TRANSISTORS		
Q1912	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	
Q1916	BC857BW SOT323	Transistor	344-28404	
Q1922	BSV52 SOT23	Transistor	344-16207	
Q1928	BC807-25 SOT23	Transistor	344-16064	
Q1931	BC857BW SOT323	Transistor	344-28404	
Q2027	BC857BW SOT323	Transistor	344-28404	
Q2076	BC857BW SOT323	Transistor	344-28404	
Q2078	BC857BW SOT323	Transistor	344-28404	
Q2081	BC857BW SOT323	Transistor	344-28404	
Q2083	BC857BW SOT323	Transistor	344-28404	
Q2226	BC857BW SOT323	Transistor	344-28404	
Q2371	BC847BW SOT323	Transistor	344-27272	
Q2472	BC857BW SOT323	Transistor	344-28404	
Q2482	BC857BW SOT323	Transistor	344-28404	
Q2486	BC847BW SOT323	Transistor	344-27272	
Q2492	BC857BW SOT323	Transistor	344-28404	
Q2496	BC847BW SOT323	Transistor	344-27272	
Q2556	BC847BW SOT323	Transistor	344-27272	
Q2561	BC847BW SOT323	Transistor	344-27272	
Q2581	BC847BW SOT323	Transistor	344-27272	
Q2612	BC847BW SOT323	Transistor	344-27272	
Q2616	BC847BW SOT323	Transistor	344-27272	
Q2623	BC857BW SOT323	Transistor	344-28404	
Q2626	BC857BW SOT323	Transistor	344-28404	
Q2628	BC857BW SOT323	Transistor	344-28404	
Q2638	BC847BW SOT323	Transistor	344-27272	
Q2639	BC847BW SOT323	Transistor	344-27272	
Q2721	BC847BW SOT323	Transistor	344-27272	
Q2726	BC847BW SOT323	Transistor	344-27272	
Q2731	BC847BW SOT323	Transistor	344-27272	
Q2737	BC847BW SOT323	Transistor	344-27272	
Q2755	BC847BW SOT323	Transistor	344-27272	
Q2758	BC847BW SOT323	Transistor	344-27272	
Q2762	BC847BW SOT323	Transistor	344-27272	
Q2765	BC847BW SOT323	Transistor	344-27272	
Q2823	BC847BW SOT323	Transistor	344-27272	

Signal Board Q2500 (H)

Art.-Nr. 88176.053-056

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
TRANSISTOREN		TRANSISTORS		
Q2831	BC847BW SOT323	Transistor	344-27272	
Q2853	BC847BW SOT323	Transistor	344-27272	
Q2856	BC857BW SOT323	Transistor	344-28404	
Q2886	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	
Q2891	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	
Q2893	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	
Q2902	BC847BW SOT323	Transistor	344-27272	
Q2951	BC847BW SOT323	Transistor	344-27272	
Q2953	BC857BW SOT323	Transistor	344-28404	
Q2957	BC847BW SOT323	Transistor	344-27272	
Q2961	BC847BW SOT323	Transistor	344-27272	
DIODEN		DIODES		
D2074	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D2293	LL 103 C	Diode	351-16947	
D2863	0,2A 75V SOD80 LL4148	Diode	351-15015	
QUARZE/FILTER		QUARTZES		
X2048	18,432000 MHz HC49U	Crystal Oscillator	385-25502	
X2181	20,250000 MHz HC49U	Crystal Oscillator	385-26686	
X2283	20,250000 MHz HC49U	Crystal Oscillator	385-26686	
X2336	12,000000 MHz HC49U CL=12PF	Crystal Oscillator	385-29247	
X2531	12,000000 MHz HC49U CL=12PF	Crystal Oscillator	385-29247	
X2876	6,000000 MHz HC49U CL=20PF	Crystal Oscillator	385-29248	
SICHERUNGEN		FUSES		
R1979	PPTC-Sicherung 0A5 60V 7D5 5R1	Thermo Fuse	381-29532.020	053
R1979	PPTC-SICH. 0A5/1A0 60V 7D5 5R1	Thermo Fuse	381-29890.020	054
R1979	PPTC-SICH. 0A5/1A0 60V 7D5 5R1	Thermo Fuse	381-29890.020	055
R1979	PPTC-SICH. 0A5/1A0 60V 7D5 5R1	Thermo Fuse	381-29890.020	056
WIDERSTÄNDE		RESISTORS		
R 37	4K7 F 0204 geschnitten	Resistor	367-20346.Y20	054
R1168	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1268	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R129	4K7 F 0204 geschnitten	Resistor	367-20346.Y20	054
R1347	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1380	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1711	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1731	10R J 0207 0,25W WIDSI	Resistor	366-20353	

Signal Board Q2500 (H)

Art.-Nr. 88176.053-056

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
WIDERSTÄNDE		RESISTORS		
R1780	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1811	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1851	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1871	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1929	10R J 0207 0,25W WIDSI	Resistor	366-20353	
SMD TEILE		SMD PARTS		
D 01	ZD 5V6 G 0W5 SOD-80 ZMM5.6	Diode	351-22580	054
D 02	1,0A 800V DO214AC FAST-GP	Diode	351-25542	054
D1237	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D1416	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D1564	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D1717	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	053
D1717	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	055
D1717	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	056
D1919	0,2A 75V SOD80 LL4148	Diode	351-15015	
D1922	0,2A 75V SOD80 LL4148	Diode	351-15015	
D1931	0,2A 75V SOD80 LL4148	Diode	351-15015	
D1932	0,2A 75V SOD80 LL4148	Diode	351-15015	
D1937	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D1981	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2031	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D2091	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D2092	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D2097	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2544	LL 103 C	Diode	351-16947	054
D2549	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2559	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2567	LL 103 C	Diode	351-16947	
D2572	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D2573	LL 103 C	Diode	351-16947	054
D2574	LL 103 C	Diode	351-16947	
D2581	ZD 20V0 J 0W5 SOD-80 ZMM20	Diode	351-22138	
D2582	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2586	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2591	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2592	0,2A 75V SOD80 LL4148	Diode	351-15015	

Signal Board Q2500 (H)**Art.-Nr. 88176.053-056**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SMD TEILE		SMD PARTS		
D2594	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2596	LL 103 C	Diode	351-16947	
D2607	ZD 20V0 J 0W5 SOD-80 ZMM20	Diode	351-22138	
D2611	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2618	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2631	LL 103 C	Diode	351-16947	
D2632	LL 103 C	Diode	351-16947	
D2657	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2661	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2667	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2735	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2781	LL 103 C	Diode	351-16947	
D2783	LL 103 C	Diode	351-16947	
D2856	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2857	LL 103 C	Diode	351-16947	
D2883	ZD 6V2 J 0W5 SOD-80 ZMM6.2	Diode	351-17534	054
D2884	ZD 6V2 J 0W5 SOD-80 ZMM6.2	Diode	351-17534	054
D2887	ZD 6V2 J 0W5 SOD-80 ZMM6.2	Diode	351-17534	054
D2889	ZD 6V2 J 0W5 SOD-80 ZMM6.2	Diode	351-17534	054
D2930	ZD 5V6 G 0W5 SOD-80 ZMM5.6	Diode	351-22580	
D2964	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2967	0,2A 75V SOD80 LL4148	Diode	351-15015	
Q 01	BC847BW SOT323	Transistor	344-27272	054
Q 02	BC847BW SOT323	Transistor	344-27272	054
Q 04	BC847BW SOT323	Transistor	344-27272	054
Q 05	BC847BW SOT323	Transistor	344-27272	054
Q 06	BC847BW SOT323	Transistor	344-27272	054
Q 07	BC847BW SOT323	Transistor	344-27272	054
Q 08	BC857BW SOT323	Transistor	344-28404	054
Q 09	BC847BW SOT323	Transistor	344-27272	054
Q 10	BC857BW SOT323	Transistor	344-28404	054
Q 11	BC847BW SOT323	Transistor	344-27272	054
Q1013	BC847BW SOT323	Transistor	344-27272	
Q1014	BC847BW SOT323	Transistor	344-27272	
Q1015	BC857BW SOT323	Transistor	344-28404	
Q1158	BC847BW SOT323	Transistor	344-27272	

Signal Board Q2500 (H)**Art.-Nr. 88176.053-056**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SMD TEILE		SMD PARTS		
Q1258	BC847BW SOT323	Transistor	344-27272	
Q1342	BC857BW SOT323	Transistor	344-28404	
Q1348	BC847BW SOT323	Transistor	344-27272	
Q1361	BC817-25W SOT323	Transistor	344-28405	
Q1381	BC847BW SOT323	Transistor	344-27272	
Q1386	BC847BW SOT323	Transistor	344-27272	
Q1441	BC847BW SOT323	Transistor	344-27272	
Q1466	BC857BW SOT323	Transistor	344-28404	
Q1551	BC857BW SOT323	Transistor	344-28404	
Q1552	BC847BW SOT323	Transistor	344-27272	
Q1556	BC847BW SOT323	Transistor	344-27272	
Q1637	BC847BW SOT323	Transistor	344-27272	
Q1641	BC847BW SOT323	Transistor	344-27272	
Q1644	BC857BW SOT323	Transistor	344-28404	
Q1651	BC847BW SOT323	Transistor	344-27272	
Q1654	BC857BW SOT323	Transistor	344-28404	
Q1666	BC857BW SOT323	Transistor	344-28404	
Q1671	BC847BW SOT323	Transistor	344-27272	
Q1771	BC847BW SOT323	Transistor	344-27272	
Q1824	BC847BW SOT323	Transistor	344-27272	
Q1901	BC857BW SOT323	Transistor	344-28404	
Q1903	BC857BW SOT323	Transistor	344-28404	
Q1906	BC857BW SOT323	Transistor	344-28404	
Q2476	BC847BW SOT323	Transistor	344-27272	
Q2594	BC847BW SOT323	Transistor	344-27272	
Q2671	BC847BW SOT323	Transistor	344-27272	
Q2741	BC847BW SOT323	Transistor	344-27272	
Q2746	BC847BW SOT323	Transistor	344-27272	
Q2752	BC847BW SOT323	Transistor	344-27272	
Q2768	BC847BW SOT323	Transistor	344-27272	
Q2772	BC847BW SOT323	Transistor	344-27272	
Q2775	BC847BW SOT323	Transistor	344-27272	
Q2778	BC847BW SOT323	Transistor	344-27272	
Q2862	BC847BW SOT323	Transistor	344-27272	
Q2883	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	
Q2888	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	

Signal Board Q2500 (H)**Art.-Nr. 88176.053-056**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SMD TEILE		SMD PARTS		
Q2943	BC847BW SOT323	Transistor	344-27272	

Signal Board Q2500 (H)**Art.-Nr. 88176.053-056**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SMD TEILE		SMD PARTS		
Q2966	BC857BW SOT323	Transistor	344-28404	

Bedienteil		Control Unit	Art.-Nr. 88117.050		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	SPULEN/LAUTSPRECHER	COILS,SPEAKERS			
L8101	Relay 5V0 62R 16A 1-pol. 29x16x13	Relay	387-29279	050	
T8101	Trafo Standby Q2500 EF16-4,7	Power Transformer	490-29284	050	
	INTEGR.SCHALTUNGEN	INTEGRATED CIRCUITS			
I8123	TL 431ACLP	Integrated Circuit	349-19817.020	050	
I8131	VIPER12# SO8	Integrated Circuit	350-29281	050	
	DIODEN	DIODES			
D8133	Gleichrichter DF 08 S	Rectifier	354-25837	050	
I8122	OPTO-Koppler DIP4 80V 50/80mA	Coupler	353-28638	050	
	SCHALTER	SWITCHES			
S8101	Netzschalter ARTICOS	Switch	471-29099	050	
	SICHERUNGEN	FUSES			
F8133	630MA T 250V 8x8	Fuse	380-13837.020	050	
	KONDENSATOREN	CAPACITORS			
C8133	Elko 4U7 M 400V	Electrolytic Capacitor	360-29280.020	050	

Bedienteil		Control Unit	Art.-Nr. 88117.050		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	SMD TEILE	SMD PARTS			
D8103	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
D8106	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
D8114	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
D8121	1,0A 200V DO214AC FAST-GP LV030	Diode	351-25539	050	
D8131	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
D8138	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
Q8111	BC847BW SOT323	Transistor	344-27272	050	
Q8114	BC847BW SOT323	Transistor	344-27272	050	

Bedienteil		Control Module	Art.-Nr. 88225.050-053	
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPULEN/LAUTSPRECHER	COILS,SPEAKERS		
L8101	Relay 5V0 62R 16A 1-pol.	Relay	387-29279	
T8101	Trafo Standby Q2500 EF16-4,7	Power Transformer	490-29284	
	ALLGEM. MECHAN. TEILE	COMMON MECHANICAL PARTS		
H8207	554 Halter/Diode vorm.	Holder	602-84535.055	
	INTEGR. SCHALTUNGEN	INTEGRATED CIRCUITS		
I8123	TL 431ACLP	Integrated Circuit	349-19817.020	
I8131	VIPER12# SO8 CHARGE	Integrated Circuit	350-29281	
I8216	IR-Empfänger (2-Farbstreifen)	Coupler	353-27396.Y20	
	BUCHSEN/FASSUNGEN	SOCKETS		
W8321	kopfhörerbuchse (Klinke)	Socket	323-15966	051
W8321	Kombibuchse 8mm	Socket	323-27124	053
W8321	Kombibuchse 6,5mm	Socket	323-27415	050
W8321	Kombibuchse 6,5mm	Socket	323-27415	052
	DIODEN	DIODES		
D8133	Gleichrichter DF 08 S	Rectifier	354-25837	
D8206	LED 3mm rot low current	Coupler	353-22140	
D8207	LED 3mm grün low current	Coupler	353-22141	
I8122	Opto-Koppler DIP4 80V 50/80mA	Coupler	353-28638	
	SCHALTER	SWITCHES		
S8101	Netzschalter 8013 LORL	Switch	471-25599	
S8201	Taster vertikal (kurz)	Switch	467-17895	050
S8201	Taster vertikal (kurz)	Switch	467-17895	051
S8201	Taster vertikal (kurz)	Switch	467-17895	053
S8201	Taster (lang)	Switch	467-28135	052
S8202	Taster vertikal (kurz)	Switch	467-17895	050
S8202	Taster vertikal (kurz)	Switch	467-17895	051
S8202	Taster vertikal (kurz)	Switch	467-17895	053
S8202	Taster (lang)	Switch	467-28135	052
S8203	Taster vertikal (kurz)	Switch	467-17895	050
S8203	Taster vertikal (kurz)	Switch	467-17895	051
S8203	Taster vertikal (kurz)	Switch	467-17895	053
S8203	Taster (lang)	Switch	467-28135	052
	SICHERUNGEN	FUSES		
F8133	630mA T 250V 8x8	Fuse	380-13837.020	
	KONDENSATOREN	CAPACITORS		
C8133	Elko 4U7 M 400V	Electrolytic Capacitor	360-29280.020	

Bedienteil		Control Module	Art.-Nr. 88225.050-053	
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	SMD PARTS		
D8106	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8111	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8112	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8114	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-25539	050
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-29831	051
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-29831	052
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-29831	053
D8131	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D8131	0,2A 75V SOD80 LL4148	Diode	351-15015	051
D8131	0,2A 75V SOD80 LL4148	Diode	351-15015	053
D8131	1,0A 200V DO214AC FAST-GP	Diode	351-29831	052
D8138	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D8138	0,2A 75V SOD80 LL4148	Diode	351-15015	051
D8138	0,2A 75V SOD80 LL4148	Diode	351-15015	053
D8201	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D8202	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D8204	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D8331	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	050
D8331	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	053
D8336	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	050
D8336	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	053
D8391	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8392	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8491	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8492	0,2A 75V SOD80 LL4148	Diode	351-15015	
Q8111	BC847BW SOT323	Transistor	344-27272	
Q8114	BC847BW SOT323	Transistor	344-27272	
Q8202	BC847BW SOT323	Transistor	344-27272	

Bedienteil		Control Module	Art.-Nr. 88226.050-051		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	SPULEN/LAUTSPRECHER	COILS,SPEAKERS			
L8101	Relay 5V0 62R 16A 1-pol.	Relay	387-29279		
T8101	Trafo Standby Q2500 EF16-4,7	Power Transformer	490-29284		
	ALLGEM. MECHAN. TEILE	COMMON MECHANICAL PARTS			
H8207	684 Halter/Diode vorm.	Holder	602-84535.052	050	
H8207	554 Halter/Diode vorm.	Holder	602-84535.055	051	
	INTEGR.SCHALTUNGEN	INTEGRATED CIRCUITS			
I8123	TL 431ACLP	Integrated Circuit	349-19817.020		
I8131	VIPER12# SO8 CHARGE	Integrated Circuit	350-29281		
I8216	IR-Empfänger (2-Farbstreifen)	Coupler	353-27396.Y20		
	BUCHSEN/FASSUNGEN	SOCKETS			
W8321	Kombibuchse 6,5mm	Socket	323-27415	051	
W8321	Kombibuchse	Socket	323-28586	050	
	DIODEN	DIODES			
D8133	Gleichrichter DF 08 S	Rectifier	354-25837		
D8206	LED 3mm rot low current	Coupler	353-22140		
D8207	LED 3mm grün low current	Coupler	353-22141		
I8122	Opto-Koppler DIP4 80V 50/80mA	Coupler	353-28638		
	SCHALTER	SWITCHES			
S8101	Netzschalter 8013 LORL	Switch	471-25599		
S8201	Taster (lang)	Switch	467-28135		
S8202	Taster (lang)	Switch	467-28135		
S8203	Taster (lang)	Switch	467-28135		
	SICHERUNGEN	FUSES			
F8133	630mA T 250V 8x8	Fuse	380-13837.020		
	KONDENSATOREN	CAPACITORS			
C8133	Elko 4U7 M 400V	Electrolytic Capacitor	360-29280.020		

Bedienteil		Control Module	Art.-Nr. 88226.050-051		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	SMD TEILE	SMD PARTS			
D8106	0,2A 75V SOD80 LL4148	Diode	351-15015		
D8111	0,2A 75V SOD80 LL4148	Diode	351-15015		
D8112	0,2A 75V SOD80 LL4148	Diode	351-15015		
D8114	0,2A 75V SOD80 LL4148	Diode	351-15015		
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-25539	051	
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-29831	050	
D8131	0,2A 75V SOD80 LL4148	Diode	351-15015		
D8138	0,2A 75V SOD80 LL4148	Diode	351-15015		
D8201	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532		
D8202	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532		
D8204	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532		
D8331	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532		
D8336	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532		
D8391	0,2A 75V SOD80 LL4148	Diode	351-15015		
D8392	0,2A 75V SOD80 LL4148	Diode	351-15015		
D8491	0,2A 75V SOD80 LL4148	Diode	351-15015		
D8492	0,2A 75V SOD80 LL4148	Diode	351-15015		
Q8111	BC847BW SOT323	Transistor	344-27272		
Q8114	BC847BW SOT323	Transistor	344-27272		
Q8202	BC847BW SOT323	Transistor	344-27272		

Fernbedienung		Remote Control	Art.-Nr. 87000.091		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	GEBER-ERSATZTEILE	SPARE PARTS FOR TRANSMITTER			
10	ICMOS PIC16LC77 MQFP	Integrated Circuit	350-28769	091	
10	Gehäuse-Oberteil Control MM	Cover	756-87213.011	091	
20	Fenster	Window	666-87216.001	091	
20	Batteriefeder 1-fach	Spring	739-85278.001	091	
20	Batteriefeder vergoldet	Spring	739-87217.002	091	
20	Gehäuse-Oberteil kpl.	Cover	756-87213.054	091	
30	Display Control 1	Coupler	353-87219.001	091	
30	Gummiknopf schwarz Joystick	Damping Rubber	406-27437	091	
30	Micro-Joystick	Keyboard	466-27430	091	
35	Zebra Gummi für Display	Spring Contact	309-87263.001	091	
40	Kontaktmatte Controller MM	Spring Contact	309-87284.001	091	
60	Klebfolie 40x4	Foam Plastics Ledge	411-18668	091	
70	EJOT-PT-Schraube 1,8x6	Screw	440-27300	091	
70	Gehäuse-Unterteil Control MM	Cover	756-87214.021	091	
71	Knopf/Taster	Button	682-87288.001	091	
80	Klebfolie 40x4	Foam Plastics Ledge	411-18668	091	
85	Batteriefeder 2-fach	Spring	739-85279.001	091	
90	Batteriedeckel arktis	Cover	756-87215.011	091	

Fernbedienung		Remote Control	Art.-Nr. 87000.091		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	SPARE PARTS FOR TRANSMITTER				
C121	220U M 6V Elko	Electrolytic Capacitor	362-25508	091	
C122	220U M 6V Elko	Electrolytic Capacitor	362-25508	091	
D105	Diode BAS216 SOD110	Diode	351-27279	091	
D121	Diode LED F.D.SFH 4515	Coupler	353-27024	091	
D221	Diode LL 103 C	Diode	351-16947	091	
I101	ICMOS PIC16LC77 MQFP Progr.	Integrated Circuit	350-28769.050	091	
I212	ICMOS ZLDO330T8 SM8	Integrated Circuit	350-27367	091	
Q112	BC847BW SOT323	Transistor	344-27272	091	
Q124	BCX17 SOT23	Transistor	344-25509	091	
Q126	BC857BW SOT323	Transistor	344-28404	091	
Q216	BC857BW SOT323	Transistor	344-28404	091	
Q217	BC857BW SOT323	Transistor	344-28404	091	
X111	Ker.-Res. 4MHz mit Kond.	Ceramic Filter	386-28191	091	
Z332	Taster	Switch	467-27429	091	
Z334	Taster	Switch	467-27429	091	
Z335	Taster	Switch	467-27429	091	

IR-Fernbedienung		IR remote control	Art.-Nr. 87000.060	
Pos.Nr.	Bestell-Bezeichnung	Description	Bestell-Nr.	Var.
Item N°.			List Part N°.	Var.

GEBER-ERSATZTEILESPARE PARTS FOR TRANSMITTER				
20	Batteriefeder	Spring	739-87217002	060
20	Gehäuse-Oberteil Arktis	Cover	756-87265001	060
25	Lichtleiter	Window	666-87274001	060
30	Kontaktmatte Control 150	Spring Contact	309-87267001	060
70	Gehäuse-Unterteil Arktis	Cover	756-87264001	060
80	Batteriefeder 2-fach	Sring	739-85279001	060
90	Batteriedeckl Arktis	Cover	756-87215001	060
D104	Diode BAS216 SOD110	Diode	351-27279	060
D117	LED LG T679 SMD	Coupler	353-27021	060
D118	LED LG T679 SMD	Coupler	353-27021	060
D121	Diode LED F.D.SFH 4515	Coupler	353-27024	060
I101	ICMOS HT48CA6 24SOP M-Contr. V1.0	Integrated Circiut	350-29859001	060
Q122	Transistor BCX17 SOT23	Transistor	344-25509	060
X111	Reson 3,580000 MHZ SMD mit Kont.	Ceramic Filter	386-29931	060

Fernbedienung		Remote Control	Art.-Nr. 87000.071		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	GEBER-ERSATZTEILE	SPARE PARTS FOR TRANSMITTER			
10	Gehäuse-Oberteil CONTROL 10	Cover	756-87213.006	071	
20	Fenster	Window	666-87216.001	071	
20	Batteriefeder vergoldet	Spring	739-87217.002	071	
20	Gehäuse-Oberteil kpl. CONTROL 10	Cover	756-87213.056	071	
30	Display CONTROL 10	Coupler	353-87219.011	071	
40	Kontaktmatte CONTROL 10	Spring Contact	309-87218.102	071	
70	EJOT-PT-Schraube 1,8x6	Screw	440-27300	071	
70	Gehäuse-Unterteil	Cover	756-87214.011	071	
80	Klebestreifen 40x4	Foam Plastics Ledge	411-18668	071	
80	Batteriefeder 2-fach	Spring	739-85279.001	071	
90	Batteriedeckel arktis	Cover	756-87215.011	071	
D105	BAS216 SOD110	Diode	351-27279	071	
D121	LED F.D.SFH 4515	Coupler	353-27024	071	
I101	ICMOS PCA84C122AT-231	Integrated Circuit	350-27787	071	
Q121	Trans. general SOT23 PNP 45V 500mA	Transistor	344-25509	071	
X111	Piezo 4,300000 MHz MELF	Ceramic Filter	386-27022	071	

Fernbedienung		Remote Control	Art.-Nr. 87000.071		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	SMD TEILE	SMD PARTS			
Q404	BC857B SOT23	Transistor	344-14979	071	
Q414	BC847B SOT23	Transistor	344-14974	071	
Q416	BC847B SOT23	Transistor	344-14974	071	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SPULEN/LAUTSPRECHER		COILS,SPEAKERS		
L3226	Dr. EMV Typ RB 4-pol. 1A 50V 0,08 Ohm	Choke	298-28883	060
L3226	Dr. EMV Typ RB 4-pol. 1A 50V 0,08 Ohm	Choke	298-28883	062
L3226	Dr. EMV Typ RB 4-pol. 1A 50V 0,08 Ohm	Choke	298-28883	067
L3366	Dr. 4U7 K 0,75A	Choke	298-14991	
ALLGEM. MECHAN. TEILE		COMMON MECHANICAL PARTS		
61	Montageclip Bildrohrpl.-IC's	Spring	739-23415	
INTEGR.SCHALTUNGEN		INTEGRATED CIRCUITS		
I3371	TDA6111	Integrated Circuit	349-23123	
I3381	TDA6111	Integrated Circuit	349-23123	
I3391	TDA6111	Integrated Circuit	349-23123	
BUCHSEN/FASSUNGEN		SOCKETS		
20	Bildrohrfassung	Socket	320-23997	062
20	Bildrohrfassung	Socket	320-24766	060
20	Bildrohrfassung	Socket	320-24766	063
20	Bildrohrfassung	Socket	320-24766	067
TRANSISTOREN		TRANSISTORS		
Q3221	BC640	Transistor	346-25720.020	060
Q3221	BC640	Transistor	346-25720.020	062
Q3221	BC640	Transistor	346-25720.020	067
Q3222	BC639	Transistor	346-75622.020	060
Q3222	BC639	Transistor	346-75622.020	062
Q3222	BC639	Transistor	346-75622.020	067
DIODEN		DIODES		
D3351	0,5A 20V DO-35 SD103C	Diode	352-17741	
D3367	1,0A 1000V DO204AL 1N4007	Diode	352-79585	
KONDENSATOREN		CAPACITORS		
C3154	22U S 250V	Electrolytic Capacitor	360-11762.020	060
C3154	22U S 250V	Electrolytic Capacitor	360-11762.020	062
C3154	22U S 250V	Electrolytic Capacitor	360-11762.020	067
C3360	10N M 2000V	Capacitor	357-21868	
C3366	22U S 250V	Electrolytic Capacitor	360-11762.020	
C3367	22U S 250V	Electrolytic Capacitor	360-11762.020	
C3368	1N M 1000V	Capacitor	357-73102.020	
C3373	100N K 250V	Capacitor	359-26910.020	
C3383	100N K 250V	Capacitor	359-26910.020	
C3393	100N K 250V	Capacitor	359-26910.020	
WIDERSTÄNDE		RESISTORS		
R3153	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	060
R3153	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	062

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
WIDERSTÄNDE		RESISTORS		
R3153	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	067
R3362	1K5 K 0411	Resistor	365-77586	
R3364	10R J 0207	Resistor	366-77101	
R3366	270R J 0414 WIDSI	Resistor	366-27623	
R3367	1M J 0207	Resistor	366-28054	
R3368	1K5 K 0411	Resistor	365-77586	
R3374	82K G 0207	Resistor	367-10885	
R3378	560R K 0411	Resistor	365-15309	
R3384	82K G 0207	Resistor	367-10885	
R3388	560R K 0411	Resistor	365-15309	
R3394	82K G 0207	Resistor	367-10885	
R3398	560R K 0411	Resistor	365-15309	
SMD TEILE		SMD PARTS		
D3218	BA 592 SOD323	Diode	351-25810	060
D3218	BA 592 SOD323	Diode	351-25810	062
D3218	BA 592 SOD323	Diode	351-25810	067
D3219	BA 592 SOD323	Diode	351-25810	060
D3219	BA 592 SOD323	Diode	351-25810	062
D3219	BA 592 SOD323	Diode	351-25810	067
D3341	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3342	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3354	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3371	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3373	BAV103 IMPLITEC-Diode	Diode	351-27246	
D3376	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3381	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3383	BAV103 IMPLITEC-Diode	Diode	351-27246	
D3386	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3391	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3393	BAV103 IMPLITEC-Diode	Diode	351-27246	
D3396	0,2A 75V SOD80 LL4148	Diode	351-15015	
Q3157	BC856BW SOT323	Transistor	344-28629	060
Q3157	BC856BW SOT323	Transistor	344-28629	062
Q3157	BC856BW SOT323	Transistor	344-28629	067
Q3161	BC847BW SOT323	Transistor	344-27272	
Q3171	BC847BW SOT323	Transistor	344-27272	
Q3181	BC847BW SOT323	Transistor	344-27272	
Q3204	BC847BW SOT323	Transistor	344-27272	060
Q3204	BC847BW SOT323	Transistor	344-27272	062

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SMD TEILE		SMD PARTS		
Q3204	BC847BW SOT323	Transistor	344-27272	067
Q3211	BC857BW SOT323	Transistor	344-28404	060
Q3211	BC857BW SOT323	Transistor	344-28404	062
Q3211	BC857BW SOT323	Transistor	344-28404	067
Q3216	BC847BW SOT323	Transistor	344-27272	060
Q3216	BC847BW SOT323	Transistor	344-27272	062
Q3216	BC847BW SOT323	Transistor	344-27272	067
Q3341	BC857BW SOT323	Transistor	344-28404	
Q3343	BC847BW SOT323	Transistor	344-27272	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SMD TEILE		SMD PARTS		
Q3376	BFN22 SOT23	Transistor	344-15349	060
Q3376	BFN22 SOT23	Transistor	344-15349	062
Q3376	BFN22 SOT23	Transistor	344-15349	067
Q3386	BFN22 SOT23	Transistor	344-15349	060
Q3386	BFN22 SOT23	Transistor	344-15349	062
Q3386	BFN22 SOT23	Transistor	344-15349	067
Q3396	BFN22 SOT23	Transistor	344-15349	060
Q3396	BFN22 SOT23	Transistor	344-15349	062
Q3396	BFN22 SOT23	Transistor	344-15349	067

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPULEN/LAUTSPRECHER	COILS,SPEAKERS		
L3366	Dr. 4U7 K 0,75A	Choke	298-14991	
L3428	Dr. EMV Typ RB 4-pol. 1A 50V 0,08 Ohm	Choke	298-28883	
	ALLGEM. MECHAN. TEILE	COMMON MECHANICAL PARTS		
61	Montageclip Bildr.-Pl. IC's	Spring	739-23415	
	INTEGR. SCHALTUNGEN	INTEGRATED CIRCUITS		
I3371	TDA6111	Integrated Circuit	349-23123	
I3381	TDA6111	Integrated Circuit	349-23123	
I3391	TDA6111	Integrated Circuit	349-23123	
	BUCHSEN/FASSUNGEN	SOCKETS		
20	Bildrohrfassung FA ME	Socket	320-28089	051
20	Bildrohrfassung	Socket	320-29531	050
20	Bildrohrfassung	Socket	320-29531	052
	TRANSISTOREN	TRANSISTORS		
Q3424	BC640	Transistor	346-25720.020	
Q3434	BC639	Transistor	346-75622.020	
Q3444	BC640	Transistor	346-25720.020	
Q3454	BC639	Transistor	346-75622.020	
	DIODEN	DIODES		
D3351	0,5A 20V DO-35 SD103C	Diode	352-17741	
D3367	1,0A 1000V DO204AL 1N4007	Diode	352-79585	
	POTENTIOMETER	POTENTIOMETERS		
10	45M M 0,5W lin. 20x22 steh.	Potentiometer	375-29666	050
10	45M M 0,5W lin. 20x22 steh.	Potentiometer	375-29666	052
P3001	45M M 0,5W lin. 20x22 steh.	Potentiometer	375-29666.Y20	050
P3001	45M M 0,5W lin. 20x22 steh.	Potentiometer	375-29666.Y20	052
	KONDENSATOREN	CAPACITORS		
C3360	10N M 2000V	Capacitor	357-21868	
C3366	Elko 22U S 250V	Electrolytic Capacitor	360-11762.020	
C3367	Elko 22U S 250V	Electrolytic Capacitor	360-11762.020	
C3368	1N M 1000V	Capacitor	357-73102.020	
C3373	100N K 250V	Capacitor	359-26910.020	
C3383	100N K 250V	Capacitor	359-26910.020	
C3393	100N K 250V	Capacitor	359-26910.020	
C3461	Elko 22U S 250V	Electrolytic Capacitor	360-11762.020	
C3463	220N J 100V	Capacitor	359-27013.020	

Bildrohrplatte CRT P.C.B Art.-Nr. 88319.050-052

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	WIDERSTÄNDE	RESISTORS		
R3360	22M J 0207	Resistor	367-28262	051
R3362	1K5 K 0411	Resistor	365-77586	
R3364	10R J 0207	Resistor	366-77101	
R3366	270R J 0414 WIDS1	Resistor	366-27623	
R3367	1M J 0207	Resistor	366-28054	
R3368	1K5 K 0411	Resistor	365-77586	
R3374	82K G 0207	Resistor	367-10885	
R3378	560R K 0411	Resistor	365-15309	
R3384	82K G 0207	Resistor	367-10885	
R3388	560R K 0411	Resistor	365-15309	
R3394	82K G 0207	Resistor	367-10885	
R3398	560R K 0411	Resistor	365-15309	
R3461	3R3 J 0207 0,50W WIDS1	Resistor	366-27701	
	SMD TEILE	SMD PARTS		
D3336	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3341	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3342	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3371	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3373	BAV103 IMPLITEC-Diode	Diode	351-27246	
D3376	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3381	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3383	BAV103 IMPLITEC-Diode	Diode	351-27246	
D3386	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3391	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3393	BAV103 IMPLITEC-Diode	Diode	351-27246	
D3396	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3411	BA 592 SOD323	Diode	351-25810	
D3412	BA 592 SOD323	Diode	351-25810	
D3413	BA 592 SOD323	Diode	351-25810	
D3414	BA 592 SOD323	Diode	351-25810	
D3421	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3451	0,2A 75V SOD80 LL4148	Diode	351-15015	
Q3161	BC847BW SOT323	Transistor	344-27272	
Q3171	BC847BW SOT323	Transistor	344-27272	
Q3181	BC847BW SOT323	Transistor	344-27272	

Bildrohrplatte		CRT P.C.B	Art.-Nr. 88319.050-052		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	

SMD TEILE		SMD PARTS			
Q3341	BC857BW SOT323	Transistor	344-28404		
Q3343	BC847BW SOT323	Transistor	344-27272		
Q3376	BFN22 SOT23	Transistor	344-15349		
Q3386	BFN22 SOT23	Transistor	344-15349		
Q3396	BFN22 SOT23	Transistor	344-15349		
Q3402	BC847BW SOT323	Transistor	344-27272		
Q3407	BC847BW SOT323	Transistor	344-27272		

Bildrohrplatte		CRT P.C.B	Art.-Nr. 88319.050-052		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	

SMD TEILE		SMD PARTS			
Q3413	BC857BW SOT323	Transistor	344-28404		
Q3421	BC846BW SOT323	Transistor	344-28895		
Q3431	BC856BW SOT323	Transistor	344-28629		
Q3441	BC846BW SOT323	Transistor	344-28895		
Q3451	BC856BW SOT323	Transistor	344-28629		
Q3462	BC856BW SOT323	Transistor	344-28629		
Q3467	BC847BW SOT323	Transistor	344-27272		

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
INTEGR. SCHALTUNGEN		INTEGRATED CIRCUITS		
I4500	TDA5637 SOT340	Integrated Circuit	350-27278	051
I4600	TSA5523M SOT266	Integrated Circuit	350-27275	051
I4800	TDA9818 TS-SSOP24	Integrated Circuit	350-28463	051
DIODEN		DIODES		
D4203	DIOVC 0A02 30V SOD323 BB640	Diode	351-26568	051
D4204	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4222	DIOVC 0A02 30V SOD323 BB640	Diode	351-26568	051
D4241	DIOVC 0A02 30V SOD323 BB640	Diode	351-26568	051
D4242	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4303	DIOVC 0A02 30V SOD323 BB639	Diode	351-26571	051
D4304	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4322	DIOVC 0A02 30V SOD323 BB639	Diode	351-26571	051
D4341	DIOVC 0A02 30V SOD323 BB639	Diode	351-26571	051
D4403	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4422	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4441	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4508	DIOVC 0A02 30V SOD323 BB640	Diode	351-26568	051
D4527	DIOVC 0A02 30V SOD323 BB639	Diode	351-26571	051
D4551	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4806	BAV 99W SOT323	Diode	351-27469	051

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SMD TEILE		SMD PARTS		
D4702	BA 592 SOD323	Diode	351-25810	051
D4703	BA 592 SOD323	Diode	351-25810	051
D4751	BA 592 SOD323	Diode	351-25810	051
D4752	BA 592 SOD323	Diode	351-25810	051
D4771	BA 592 SOD323	Diode	351-25810	051
D4772	BA 592 SOD323	Diode	351-25810	051
D4781	BA 592 SOD323	Diode	351-25810	051
D4832	BA 592 SOD323	Diode	351-25810	051
Q4702	Digital SOT323 NPN 50V 70mA 47K	Transistor	344-27270	051
Q4709	Digital SOT323 NPN 50V 70mA 47K	Transistor	344-27270	051
Q4752	Digital SOT323 NPN 50V 100mA 47K	Transistor	344-28555	051
Q4754	Digital SOT323 NPN 50V 70mA 47K	Transistor	344-27270	051
Q4772	Digital SOT323 NPN 50V 100mA 47K	Transistor	344-28555	051
Q4774	Digital SOT323 NPN 50V 70mA 47K	Transistor	344-27270	051
Q4804	BC857BW SOT323	Transistor	344-28404	051
Q4832	BCR198W SOT323 PNP	Transistor	344-27269	051
Q4833	BC847BW SOT323	Transistor	344-27272	051

Tuner/ZF (EPAS) Tuner/IF Module (EPAS) Art.-Nr. 87998.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	VERBINDUNGSLEITUNG	CONNECTING CABLES		
50	Antennenkabel 240mm mit Winkelstecker	Connecting Cable	169-27470.001	050
	INTEGR.SCHALTUNGEN	INTEGRATED CIRCUITS		
I4500	TDA5637 SOT340	Integrated Circuit	350-27278	050
I4600	TSA5523M SOT266	Integrated Circuit	350-27275	050
I4800	TDA9818 TS-SSOP24	Integrated Circuit	350-28463	050
	DIODEN	DIODES		
D4203	0A02 30V SOD323 BB640	Diode	351-26568	050
D4204	0A02 30V SOD323 BB535	Diode	351-26570	050
D4222	0A02 30V SOD323 BB640	Diode	351-26568	050
D4241	0A02 30V SOD323 BB640	Diode	351-26568	050
D4242	0A02 30V SOD323 BB535	Diode	351-26570	050
D4303	0A02 30V SOD323 BB639	Diode	351-26571	050
D4304	0A02 30V SOD323 BB535	Diode	351-26570	050
D4322	0A02 30V SOD323 BB639	Diode	351-26571	050
D4341	0A02 30V SOD323 BB639	Diode	351-26571	050
D4403	0A02 30V SOD323 BB535	Diode	351-26570	050
D4422	0A02 30V SOD323 BB535	Diode	351-26570	050
D4441	0A02 30V SOD323 BB535	Diode	351-26570	050
D4508	0A02 30V SOD323 BB640	Diode	351-26568	050
D4527	0A02 30V SOD323 BB639	Diode	351-26571	050
D4551	0A02 30V SOD323 BB535	Diode	351-26570	050
D4806	BAV 99W SOT323	Diode	351-27469	050

Tuner/ZF (EPAS) Tuner/IF Module (EPAS) Art.-Nr. 87998.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	QUARZE/FILTER	QUARTZES		
X4710	OFW-FILTER G3962	Filter	290-19700	050
	SMD TEILE	SMD PARTS		
Q4804	BC857BW SOT323	Transistor	344-28404	050

Sat 6
Art.-Nr. 87699.050-052

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BAUGRUPPEN		UNITS		
U100	SAT-Tuner DVB/FM BS2W7HG1002	Scaffolding Access.	291-28502	050
U100	SAT-Tuner DVB/FM BS2W7HG1002	Scaffolding Access.	291-28502	052
U240	SAT-Tuner SF1218/SH	Tuner	260-28462	051
U700	SAT-Tuner SF1218/SH	Tuner	260-28462	050
INTEGR. SCHALTUNGEN		INTEGRATED CIRCUITS		
I150	IC MAX4546CSE SO16 RF/Video Switch	Integrated Circuit	350-28499	052
I300	IC LM2574M-ADJ 0,5A M14B	Integrated Circuit	350-28497	
I320	IC LM 2903D SO08	Integrated Circuit	350-21674	
I360	ICMOS SAA1300 SOT142-1	Integrated Circuit	349-28501	
I400	IC TSA5523M SOT266	Integrated Circuit	350-27275	050
I400	IC TSA5523M SOT266	Integrated Circuit	350-27275	052
I450	IC LM 358 SMD	Integrated Circuit	350-21521	050
I450	IC LM 358 SMD	Integrated Circuit	350-21521	052
I700	IC STV0056A DIP56Shrink	Integrated Circuit	349-28504	
I800	IC LM2574M-ADJ 0,5A M14B	Integrated Circuit	350-28497	050
I820	IC LM 2903D SO08	Integrated Circuit	350-21674	050
I860	ICMOS SAA1300 SOT142-1	Integrated Circuit	349-28501	050
I900	IC TDA6151 SO20	Integrated Circuit	350-23124	050
QUARZE/FILTER		QUARTZES		
X789	Quarz 4,000000 MHz HC49U	Crystal Oscillator	385-20171	
WIDERSTÄNDE		RESISTORS		
R301	1R J 0207	Resistor	367-24709.020	
R801	1R J 0207	Resistor	367-24709.020	050
SMD TEILE		SMD PARTS		
D301	3,0A 40V SOD6 Schottky	Diode	351-28529	051
D301	3,0A 40V SOD6 Schottky	Diode	351-28529	052
D303	1,0A 600V	Diode	351-20547	051
D303	1,0A 600V	Diode	351-20547	052
D338	ZD 5V6 SOD80 ZMM B ITT	Diode	351-22580	051
D338	ZD 5V6 SOD80 ZMM B ITT	Diode	351-22580	052
D376	LL4148 SOD80	Diode	351-15015	
D381	LL4148 SOD80	Diode	351-15015	
D613	LL4148 SOD80	Diode	351-15015	
D613	BAS316 SOD323	Diode	351-27952	051
D614	BAS316 SOD323	Diode	351-27952	051
D616	BAS316 SOD323	Diode	351-27952	051
D624	BAS316 SOD323	Diode	351-27952	051
D626	LL4148 SOD80	Diode	351-15015	

Sat 6
Art.-Nr. 87699.050-052

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SMD TEILE		SMD PARTS		
D626	BAS316 SOD323	Diode	351-27952	051
D627	BAS316 SOD323	Diode	351-27952	051
D876	LL4148 SOD80	Diode	351-15015	050
D881	LL4148 SOD80	Diode	351-15015	050
Q103	SI2302DS MOSF. N- 1,25W SOT23	Transistor	344-28503	050
Q103	SI2302DS MOSF. N-Kanal 1,25W SOT23	Transistor	344-28503	052
Q104	SI2302DS MOSF. N-Kanal 1,25W SOT23	Transistor	344-28503	050
Q104	SI2302DS MOSF. N-Kanal 1,25W SOT23	Transistor	344-28503	052
Q107	BC847BW SOT323	Transistor	344-27272	050
Q107	BC847BW SOT323	Transistor	344-27272	052
Q108	BCR148W SOT323	Transistor	344-27270	050
Q108	BCR148W SOT323	Transistor	344-27270	052
Q109	BCR148W SOT323	Transistor	344-27270	050
Q109	BCR148W SOT323	Transistor	344-27270	052
Q121	BC847BW SOT323	Transistor	344-27272	050
Q121	BC847BW SOT323	Transistor	344-27272	052
Q316	BCR148W SOT323	Transistor	344-27270	
Q318	BC847BW SOT323	Transistor	344-27272	
Q334	BC847BW SOT323	Transistor	344-27272	
Q340	BC847BW SOT323	Transistor	344-27272	
Q352	BC847BW SOT323	Transistor	344-27272	
Q354	BC847BW SOT323	Transistor	344-27272	
Q364	BCR148W SOT323	Transistor	344-27270	
Q366	BCR148W SOT323	Transistor	344-27270	
Q367	BCR148W SOT323	Transistor	344-27270	
Q368	BCR148W SOT323	Transistor	344-27270	
Q374	BC847BW SOT323	Transistor	344-27272	
Q377	BC847BW SOT323	Transistor	344-27272	
Q392	BCR148W SOT323	Transistor	344-27270	
Q393	BC847BW SOT323	Transistor	344-27272	
Q553	BC847BW SOT323	Transistor	344-27272	
Q658	BC857W SOT323	Transistor	344-27468	050
Q658	BC857BW SOT323	Transistor	344-28404	051
Q658	BC857W SOT323	Transistor	344-27468	052
Q679	BC857W SOT323	Transistor	344-27468	050
Q679	BC857BW SOT323	Transistor	344-28404	051
Q679	BC857W SOT323	Transistor	344-27468	052
Q712	BF799LK	Transistor	344-17798	

Sat 6**Art.-Nr. 87699.050-052**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SMD TEILE		SMD PARTS		
Q723	BC857W SOT323	Transistor	344-27468	050
Q723	BC857BW SOT323	Transistor	344-28404	051
Q723	BC857W SOT323	Transistor	344-27468	052
Q752	BC847B SOT23	Transistor	344-14974	
Q757	BC847B SOT23	Transistor	344-14974	050
Q816	BCR148W SOT323	Transistor	344-27270	050
Q818	BC847BW SOT323	Transistor	344-27272	050
Q834	BC847BW SOT323	Transistor	344-27272	050
Q840	BC847BW SOT323	Transistor	344-27272	050
Q841	BCR148W SOT323	Transistor	344-27270	050
Q842	BC847BW SOT323	Transistor	344-27272	050
Q852	BC847BW SOT323	Transistor	344-27272	050
Q854	BC847BW SOT323	Transistor	344-27272	050
Q864	BCR148W SOT323	Transistor	344-27270	050
Q866	BCR148W SOT323	Transistor	344-27270	050
Q867	BCR148W SOT323	Transistor	344-27270	050

Sat 6**Art.-Nr. 87699.050-052**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SMD TEILE		SMD PARTS		
Q868	BCR148W SOT323	Transistor	344-27270	050
Q874	BC847BW SOT323	Transistor	344-27272	050
Q877	BC847BW SOT323	Transistor	344-27272	050
Q913	BC847BW SOT323	Transistor	344-27272	050
Q927	BC847BW SOT323	Transistor	344-27272	050
Q933	BC857W SOT323	Transistor	344-27468	050
Q934	BC847BW SOT323	Transistor	344-27272	050
Q941	BC857W SOT323	Transistor	344-27468	050
Q943	BC847BW SOT323	Transistor	344-27272	050
Q948	BC857B SOT23	Transistor	344-14979	050
Q952	BC857W SOT323	Transistor	344-27468	050
Q957	BC847BW SOT323	Transistor	344-27272	050
Q969	BCR198W SOT323	Transistor	344-27269	050
Q971	BC857W SOT323	Transistor	344-27468	050
Q976	BC847B SOT23	Transistor	344-14974	050

Audio-Erweiterung		Audio Ext. Modul	Art.-Nr. 88234.050	
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BUCHSEN/FASSUNGEN	SOCKETS		
W1	Cinchbuchse 4-fach quadratisch	Socket	323-29242	050
W3	Cinchbuchsenleiste 3-fach schwarz	Socket	323-29664	050

Audio-Erweiterung		Audio Ext. Modul	Art.-Nr. 88234.050	
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.

DVB1-Modul		DVB1 Module	Art.-Nr. 88223.050		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	

	ALLGEM.MECHAN.TEILE	COMMON MECHANICAL PARTS			
14	Wärmeleitfolie 10x10mm	Plasticband	190-29724.001	050	
15	Wärmeleitfolie 25X25MM	Plasticband	190-29724.002	050	
	INTEGR.SCHALTUNGEN	INTEGRATED CIRCUITS			
I7051	ICMOS STI5500BVA/BVB PQSP208	Integrated Circuit	350-27822	050	
I7081	IC 3.3V 0,8A SO08 Volt. Regulator	Integrated Circuit	350-27212	050	
I7091	IC 3.3V 0,8A SO08 Volt. Regulator	Integrated Circuit	350-27212	050	
I7251	ICMOS 74 HCT125 SMD	Integrated Circuit	350-15523	050	
I7301	ICMOS KM416V# TSOP50 60ns DRAM	Integrated Circuit	350-28457	050	
I7311	ICMOS KM416V# TSOP50 60ns DRAM	Integrated Circuit	350-28457	050	
I7321	ICMOS AT 29LV010A-15TC/20TC/25TC	Integrated Circuit	350-27821	050	
I7331	ICMOS TE28F008B3T90 TSOP40	Integrated Circuit	350-28456	050	
I7341	ICMOS TE28F008B3T90 TSOP40	Integrated Circuit	350-28456	050	
I7371	ICMOS KM416S# TSOP50 80ns SDRAM	Integrated Circuit	350-28459	050	
I7381	ICMOS KM416S# TSOP50 80ns SDRAM	Integrated Circuit	350-28459	050	
I7431	ICMOS MK2727STR SO-8	Integrated Circuit	350-28090	050	
I7551	IC UC3843# SO8 V-CONT	Integrated Circuit	350-29258	050	
I7577	ICMOS HEF4053D SO16	Integrated Circuit	350-24881	050	
I7701	IC 3.3V 0,8A SO08 Volt. Regulator	Integrated Circuit	350-27212	050	
I7721	IC STV0299B TQFP64	Integrated Circuit	350-29049	050	
I7861	ICMOS CS 4334 SO8	Integrated Circuit	350-27826	050	
I7901	IC LM2574M-ADJ 0,5A M14B	Integrated Circuit	350-28497	050	
I7931	IC-VR 12V00 G 0A25 CDT120 4931	Integrated Circuit	350-29256	050	
I7981	I.C. TL 7702 ACD SO-8 LV 030	Integrated Circuit	350-27827	050	
	QUARZE/FILTER	QUARTZES			
X7436	13,500000 MHz HC49U	Crystal Oscillator	385-18287	050	
X7758	4,000000 MHz HC49U	Crystal Oscillator	385-17297	050	

DVB1-Modul		DVB1 Module	Art.-Nr. 88223.050		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	

	SMD TEILE	SMD PARTS			
D7206	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
D7212	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
D7232	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
D7239	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
D7242	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
D7249	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
D7346	0,2A 75V SOD80 LL4148	Diode	351-15015	050	
D7465	LL 103 C	Diode	351-16947	050	
D7466	LL 103 C	Diode	351-16947	050	
D7554	3,0A 40V SOD6 Schottky	Diode	351-28529	050	
D7761	1,0A 600V	Diode	351-20547	050	
D7902	3,0A 40V SOD6 Schottky	Diode	351-28529	050	
Q7156	BC847BW SOT323	Transistor	344-27272	050	
Q7201	BC857BW SOT323	Transistor	344-28404	050	
Q7211	BC847BW SOT323	Transistor	344-27272	050	
Q7230	BC857BW SOT323	Transistor	344-28404	050	
Q7231	BC847BW SOT323	Transistor	344-27272	050	
Q7235	BC857BW SOT323	Transistor	344-28404	050	
Q7240	BC857BW SOT323	Transistor	344-28404	050	
Q7241	BSV52 SOT23	Transistor	344-16207	050	
Q7245	BC857BW SOT323	Transistor	344-28404	050	
Q7257	BC847BW SOT323	Transistor	344-27272	050	
Q7341	BC857BW SOT323	Transistor	344-28404	050	
Q7551	17NE03# TO252 17A0 30V NCH	Transistor	344-29257	050	
Q7577	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	050	
Q7580	BC847BW SOT323	Transistor	344-27272	050	
Q7581	BC857BW SOT323	Transistor	344-28404	050	
Q7586	BC847BW SOT323	Transistor	344-27272	050	
Q7592	BC847BW SOT323	Transistor	344-27272	050	
Q7812	BC857BW SOT323	Transistor	344-28404	050	
Q7822	BC857BW SOT323	Transistor	344-28404	050	
Q7832	BC857BW SOT323	Transistor	344-28404	050	
Q7842	BC857BW SOT323	Transistor	344-28404	050	
Q7852	BC857BW SOT323	Transistor	344-28404	050	

Frequenzweiche Cross-over network Art.-Nr. 85729.072

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
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	SPEZIALTEILE	SPECIAL PARTS		
L 01	Dr. 1mH8	Choke	298-22671	072
N 05	Kabelbaum 3/2-pol. 150lg. UL NAT	Connecting Cable	171-88432.051	072
N 08	Kabelbaum 3/2-pol. 150lg. UL NAT	Connecting Cable	171-88432.051	072

Frequenzweiche Cross-over network Art.-Nr. 85729.072

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
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W 01	Stiftwanne vert. 3-p. natur	Contact Ledge	326-28095	072
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Frequenzweiche		Cross-over network	Art.-Nr. 85729.077	
Pos.Nr.	Bestell-Bezeichnung	Description	Bestell-Nr.	Var.
Item N°.			List Part N°.	Var.
	SPEZIALTEILE	SPECIAL PARTS		
N05	Kabelbaum 3/2-pol. 200lg. UL natur	Connecting Cable	171-88432.059	077
R01	4R7 K 5,00W	Resistor	368-25590	077
W01	Stiftwanne vert. 3-pol. natur	Contact Ledge	326-28095	077

Frequenzweiche		Cross-over network	Art.-Nr. 85729.077	
Pos.Nr.	Bestell-Bezeichnung	Description	Bestell-Nr.	Var.
Item N°.			List Part N°.	Var.

AC3-Modul		AC3 Module	Art.-Nr. 88228.050		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	INTEGR. SCHALTUNGEN	INTEGRATED CIRCUITS			
10	ICMOS OTP VSOP32 256KX8	Integrated Circuit	350-28694	050	
I001	ICMOS CS4925 PLCC44	Integrated Circuit	350-28692	050	
I002	ICMOS CS4226 TQFP44	Integrated Circuit	350-28693	050	
I003	ICMOS 74LVC574APW TSOP20	Integrated Circuit	350-28695	050	
I004	ICMOS 74LVC574APW TSOP20	Integrated Circuit	350-28695	050	
I005	ICMOS OTP VSOP32 256KX8 SW V1.0	Integrated Circuit	350-28694050	050	
I006	ICMOS SSM2404 SO20	Integrated Circuit	350-28699	050	
I007	MC33079 SO14	Integrated Circuit	350-28701	050	
I008	MC33079 SO14	Integrated Circuit	350-28701	050	
I009	ICMOS HEF4053D SO16	Integrated Circuit	350-24881	050	
I010	ICMOS M34063A SO008	Integrated Circuit	350-28429	050	
I011	ICMOS 8575 SOT340 I/O-EXP.J2C	Integrated Circuit	350-29252	050	
I012	MC33078 SO8	Integrated Circuit	350-28702	050	
I013	ICMOS HCF4081B SO14	Integrated Circuit	350-28689	050	
I014	ICMOS SSM2404 SO20	Integrated Circuit	350-28699	050	
I015	ICMOS 74LVC125APW TSSOP14	Integrated Circuit	350-28697	050	
I016	ICMOS 74LVC14APW TSSOP14	Integrated Circuit	350-28748	050	
I018	NJM2234 SSOP-8 Video-Switch	Integrated Circuit	350-29253	050	

AC3-Modul		AC3 Module	Art.-Nr. 88228.050		
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	SMD TEILE	SMD PARTS			
D001	DIOZD 5V6 G 0W5 SOD-80 ZMM5.6	Diode	351-22580	050	
D002	1,0A 800V DO214AC FAST-GP	Diode	351-25542	050	
Q001	BC847BW SOT323	Transistor	344-27272	050	
Q002	BC847BW SOT323	Transistor	344-27272	050	
Q004	BC847BW SOT323	Transistor	344-27272	050	
Q005	BC847BW SOT323	Transistor	344-27272	050	
Q006	BC847BW SOT323	Transistor	344-27272	050	
Q007	BC847BW SOT323	Transistor	344-27272	050	
Q008	BC857BW SOT323	Transistor	344-28404	050	
Q009	BC847BW SOT323	Transistor	344-27272	050	
Q010	BC857BW SOT323	Transistor	344-28404	050	
Q011	BC847BW SOT323	Transistor	344-27272	050	

VGA/IR-Modul		VGA/IR Module		Art.-Nr. 87717.050	
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	INTEGR. SCHALTUNGEN	INTEGRATED CIRCUITS			
I811	ICMOS 74HCT 86 SO14	Integrated Circuit	350-16065	050	
I891	ICMOS 74HCT 00 SO14	Integrated Circuit	350-15555	050	
I896	SN74LS92D SO14 TTL	Integrated Circuit	350-28484	050	
	BUCHSEN/FASSUNGEN	SOCKETS			
W801	Subminiatur-Buchse 15-pol.	Socket	323-28415	050	
W876	Kopfhörerbuchse 2,5mm	Socket	323-27389	050	
W881	Kopfhörerbuchse 3,5mm Mono	Socket	323-28672	050	
	QUARZE/Filter	QUARTZES			
X893	Piezo Filter 429,0KHz	Ceramic Filter	386-18622	050	

VGA/IR-Modul		VGA/IR Module		Art.-Nr. 87717.050	
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.	
	WIDERSTÄNDE	RESISTORS			
10	33R J 0207	Resistor	366-22944	050	
R882	33R geschnitten	Resistor	366-22944.Y01	050	
	SMD TEILE	SMD PARTS			
D876	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	050	
D877	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	050	
D887	Diode 0,2A 75V SOD80 LL4148	Diode	351-15015	050	
Q881	BC807-25 SOT23	Transistor	344-16064	050	

VGA/IR-Modul		VGA/IR Module	Art.-Nr. 87717.070	
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	UNITS		
20	Lpl. IR-Adapter kpl. Q24/25	P.C.B	396-87717.070	
	GERÄTEBEIPACK	SET SUPPLEMENT		
21	Haltewinkel	Angle	592-88127.001	
22	Schraube schwarz CM3,0X6 DIN 7500 ST	Screw	432-26944	
	GEHÄUSETEILE	CABINET MOUNTING		
10	Abdeckung SCART Q25M/H	Mask	703-87728.001	
11	Schraube schwarz CM3,0X6 DIN 7500 ST	Screw	432-26944	
25	Neoprenstanzteil 15x10x6 selbstklebend	Foam Plastics Ledge	411-22286.002	
	INTEGR. SCHALTUNGEN	INTEGRATED CIRCUITS		
I891	ICMOS 74HCT 00 SO14	Integrated Circuit	350-15555	070
I896	SN74LS92D SO14 TTL	Integrated Circuit	350-28484	070

VGA/IR-Modul		VGA/IR Module	Art.-Nr. 87717.070	
Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BUCHSEN/FASSUNGEN	SOCKETS		
W881	Kopfhörerbuchse 3,5mm Mono	Socket	323-28672	070
	QUARZE/FILTER	QUARTZES		
X893	Piezo Filter 429,0KHz	Ceramic Filter	386-18622	070
	WIDERSTÄNDE	RESISTORS		
10	33R J 0207	Resistor	366-22944	070
R882	33R geschnitten	Resistor	366-22944.Y01	070
	SMD TEILE	SMD PARTS		
D887	0,2A 75V SOD80 LL4148	Diode	351-15015	070
Q881	BC807-25 SOT23	Transistor	344-16064	070

TVO-Modul
Art.-Nr. 87647.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
SPULEN/LAUTSPRECHER		COILS,SPEAKERS		
L071	Dr. 270U J DR270/5 R5	Choke	298-26895	050
L886	Übertrager 2-fach ISDN SMD	Coil	297-28418	050
L887	EMV-Drossel ARRAY ISDN SMD	Coil	297-28419	050
INTEGR.SCHALTUNGEN		INTEGRATED CIRCUITS		
10	ICMOS LT1086CT-3.3 TO220	Integrated Circuit	349-28421	050
10	ICMOS AT 89C51 PLCC44	Integrated Circuit	350-27378	050
10	ICMOS AT29C020-12JC PLCC32	Integrated Circuit	350-28422	050
I051	ICMOS LT1086CT-3.3 TO220	Integrated Circuit	349-28421Y21	050
I052	IC 3.3V 1,5A DD-P Volt.Regulat.	Integrated Circuit	350-28739030	050
I061	ICMOS M34063A SO008	Integrated Circuit	350-28429	050
I101	ICMOS ELAN SC400 - 100 AC BGA292	Integrated Circuit	350-28428	050
I201	ICMOS DRAM 64MB			
	4MX16 60NS 3,3V TSOP050	Integrated Circuit	350-28427	050
I206	ICMOS DRAM 64MB			
	4MX16 60NS 3,3V TSOP050	Integrated Circuit	350-28427	050
I211	ICMOS 74ALVC164245 SSOP48	Integrated Circuit	350-28426	050
I231	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	050
I236	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	050
I241	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	050
I251	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	050
I256	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	050
I266	ICMOS 74ACT139 SO016	Integrated Circuit	350-28431	050
I271	ICMOS AM29F016B-120 F4C TSOP40	Integrated Circuit	350-28720	050
I276	ICMOS AM29F016B-120 F4C TSOP40	Integrated Circuit	350-28720	050
I281	ICMOS AM29F016B-120 E4C TSOP40	Integrated Circuit	350-28430	050
I286	ICMOS AM29F016B-120 E4C TSOP40	Integrated Circuit	350-28430	050
I291	ICMOS 29C020-12JC PROGR. V1.0	Integrated Circuit	350-28422050	050
I511	ICMOS CYPERSO 5050 QFP208	Integrated Circuit	350-28425	050
I561	ICMOS KM4132G512Q-8/G0 FP100	Integrated Circuit	350-28432	050
I641	ICMOS CS4297-JQ TQFP48	Integrated Circuit	350-28434	050
I691	ICMOS 74 ABT 16245CSSC SSOP	Integrated Circuit	350-28635	050
I701	ICMOS FDC37C932 QFL160	Integrated Circuit	350-28435	050
I711	ICMOS 89C51 PROGR. V1.8	Integrated Circuit	350-27378058	050
I726	ICMOS 74ACT14 SO014	Integrated Circuit	350-28436	050
I791	ICMOS GD75232 LGS/75C185 TI SO020	Integrated Circuit	350-28437	050
I818	ICMOS 74 HCT126 SO14 SMD	Integrated Circuit	350-28664	050
I841	ICMOS GD75232 LGS/75C185 TI SO020	Integrated Circuit	350-28437	050
I866	ICMOS PSB2115 H V 1.1 QFP64	Integrated Circuit	350-28439	050
I911	ICMOS 74ACT 32-D SO14	Integrated Circuit	350-22442	050
I931	ICMOS 74ACT 08 SO14	Integrated Circuit	350-24306	050

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Art.-Nr. 87647.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BUCHSEN/FASSUNGEN		SOCKETS		
I291	IC-Fassung 32-pol.	Socket	320-23672	050
I711	IC-Fassung 44-pol.	Socket	320-24662	050
DIODEN		DIODES		
10	Diode 1 N 5819	Diode	352-24307	050
D071	Diode 1 N 5819	Diode	352-24307Y03	050
QUARZE/FILTER		QUARTZES		
X186	Quarz 32,768 KHz 9x3,5x3 SMD	Crystal Oscillator	385-28738030	050
X396	Quarz 14.318180 MHz VX3A Oscil.SMD	Crystal Oscillator	385-28449	050
X506	Quarz 24,576000 MHz VX3MH Oscil.SMD	Crystal Oscillator	385-28816	050
X723	Quarz 11,059200 MHz HC49U3H Low Profile	Crystal Oscillator	385-16812	050
X876	Quarz 7,680000 MHz HC49U3 Low Profile	Crystal Oscillator	385-19213	050
KONDENSATOREN		CAPACITORS		
C086	Elko 1F Z 5,5V R20,0 12X6 Goldcap	Electrolyt Capacitor	360-28442	050
SMD TEILE		SMD PARTS		
D080	Diode LL4148 SOD80	Diode	351-15015	050
D081	Diode ZMM C3V0 SOD80 SMD	Diode	351-22085	050
D087	Diode LL4148 SOD80	Diode	351-15015	050
D091	Diode LL4148 SOD80	Diode	351-15015	050
D592	Diode LL4148 SOD80	Diode	351-15015	050
D594	Diode LL4148 SOD80	Diode	351-15015	050
D825	Diode LL4148 SOD80	Diode	351-15015	050
D828	Diode LL4148 SOD80	Diode	351-15015	050
D835	Diode LL4148 SOD80	Diode	351-15015	050
D838	Diode LL4148 SOD80	Diode	351-15015	050
D883	Diode BAV 99 SOT23	Diode	351-18831	050
D884	Diode BAV 99 SOT23	Diode	351-18831	050
D890	Diode ZMM C3V0 SOD80 SMD	Diode	351-22085	050
D891	Diode BAV 99 SOT23	Diode	351-18831	050
D892	Diode BAV 99 SOT23	Diode	351-18831	050
Q081	Transistor BC847B SOT23	Transistor	344-14974	050
Q083	Transistor BC857B SOT23	Transistor	344-14979	050
Q533	Transistor BC847B SOT23	Transistor	344-14974	050
Q812	Transistor BC847B SOT23	Transistor	344-14974	050
Q821	Transistor BC857B SOT23	Transistor	344-14979	050
Q827	Transistor BC847B SOT23	Transistor	344-14974	050
Q831	Transistor BC857B SOT23	Transistor	344-14979	050
Q837	Transistor BC847B SOT23	Transistor	344-14974	050

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Art.-Nr.87647.060-062

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPULEN/LAUTSPRECHER	COILS,SPEAKERS		
L 71	Dr. 270uH J	Choke	298-26895	
L886	Übertrager 2-fach ISDN SMD	Coil	297-28418	
L887	EMV-Drossel Array ISDN SMD	Coil	297-28419	
	INTEGR. SCHALTUNGEN	INTEGRATED CIRCUITS		
10	ICMOS AT 89C51 PLCC44 Microcontroller	Integrated Circuit	350-27378	
10	ICMOS 29C020# PLCC32 120N Flash	Integrated Circuit	350-28422	
I 52	3.3V 1,5A DD-P Volt. Regulator	Integrated Circuit	350-28739.030	
I 61	ICMOS M34063A SO008	Integrated Circuit	350-28429	
I101	ICMOS ELAN SC400 - 100 AC BGA292	Integrated Circuit	350-28428	
I201	ICMOS DRAM 64MB 60ns 3,3V TSOP050	Integrated Circuit	350-28427	
I206	ICMOS DRAM 64MB 60ns 3,3V TSOP050	Integrated Circuit	350-28427	
I211	ICMOS 74ALVC164245 SSOP48	Integrated Circuit	350-28426	
I231	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	
I236	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	
I241	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	
I251	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	
I256	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	
I291	ICMOS 29C020-12JC PROGR. V1.1 TVO2	Integrated Circuit	350-28422.051	
I431	ICMOS MIC2563A-1BSM SSOP28	Integrated Circuit	350-28423	061
I431	ICMOS MIC2563A-1BSM SSOP28	Integrated Circuit	350-28423	062
I446	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	061
I446	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	062
I511	ICMOS CYPERPPO 5050 QFP208	Integrated Circuit	350-28425	
I561	ICMOS SGRAM 256Kx32x2 8ns PQFP100	Integrated Circuit	350-28432	
I641	ICMOS CS4297A-JQ,CS4297A-KQ	Integrated Circuit	350-28434	
I691	ICMOS 74ABT16245 SSOP	Integrated Circuit	350-28635	
I701	ICMOS FDC37C932 QFL160	Integrated Circuit	350-28435	
I711	ICMOS 89C51 PROGR. V2.0	Integrated Circuit	350-27378.060	
I726	ICMOS 74ACT14 SO014	Integrated Circuit	350-28436	
I791	ICMOS GD75232 LGS/75C185 TI SO020	Integrated Circuit	350-28437	
I818	ICMOS 74HCT126 SO14	Integrated Circuit	350-28664	
I841	ICMOS GD75232 LGS/75C185 TI SO020	Integrated Circuit	350-28437	
I866	ICMOS PSB2115 H V 1.1 QFP64	Integrated Circuit	350-28439	
I911	ICMOS 74ACT 32-D SO14	Integrated Circuit	350-22442	
I931	ICMOS 74ACT 08 SO14	Integrated Circuit	350-24306	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BUCHSEN/FASSUNGEN	SOCKETS		
I291	IC-Fassung 32-pol.	Socket	320-23672	
I711	IC-Fassung 44-pol.	Socket	320-24662	
W613	Subminiatur-Buchse 15-pol.	Socket	323-28415	062
W681	Kopfhörerbuchse 3,5mm horiz.	Socket	323-24591	062
W729	Kopfhörerbuchse 2,5mm	Socket	323-27389	062
	DIODEN	DIODES		
10	1 N 5819	Diode	352-24307	
D 71	1 N 5819	Diode	352-24307.Y03	
	QUARZE/FILTER	QUARTZES		
X186	32,768 KHz SMD	Crystal Oscillator	385-28738.030	
X396	14.318180 MHz VX3A OSZIL.SMD	Crystal Oscillator	385-28449	
X506	24,576000 MHz VX3MH OSZIL.SMD	Crystal Oscillator	385-28816	
X723	11,059200 MHz HC49U3H low profile	Crystal Oscillator	385-16812	
X876	7,680000 MHz HC49U3 low profile	Crystal Oscillator	385-19213	
	KONDENSATOREN	CAPACITORS		
C 86	Elko 1F Z 5,5V GOLDCAP	Electrolytic Capacitor	360-28442	
	SMD TEILE	SMD PARTS		
D 80	0,2A 75V SOD80 LL4148	Diode	351-15015	
D 81	ZD 3V0 J 0W5 SOD-80 ZMM3	Diode	351-22085	
D 87	0,2A 75V SOD80 LL4148	Diode	351-15015	
D 91	0,2A 75V SOD80 LL4148	Diode	351-15015	
D592	0,2A 75V SOD80 LL4148	Diode	351-15015	
D594	0,2A 75V SOD80 LL4148	Diode	351-15015	
D825	0,2A 75V SOD80 LL4148	Diode	351-15015	
D828	0,2A 75V SOD80 LL4148	Diode	351-15015	
D835	0,2A 75V SOD80 LL4148	Diode	351-15015	
D838	0,2A 75V SOD80 LL4148	Diode	351-15015	
D883	BAV 99 SOT23	Diode	351-18831	
D884	BAV 99 SOT23	Diode	351-18831	
D890	ZD 3V0 J 0W5 SOD-80 ZMM3	Diode	351-22085	
D891	BAV 99 SOT23	Diode	351-18831	
D892	BAV 99 SOT23	Diode	351-18831	
Q 81	BC847B SOT23	Transistor	344-14974	
Q 83	BC857B SOT23	Transistor	344-14979	
Q533	BC847B SOT23	Transistor	344-14974	

TVO2**Art.-Nr.87647.060-062**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	SMD PARTS		
Q812	BC847B SOT23	Transistor	344-14974	
Q821	BC857B SOT23	Transistor	344-14979	
Q827	BC847B SOT23	Transistor	344-14974	

TVO2**Art.-Nr.87647.060-062**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	SMD PARTS		
Q831	BC857B SOT23	Transistor	344-14979	
Q837	BC847B SOT23	Transistor	344-14974	

Aconda 9281ZW**Art.-Nr. 61401.62**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BAUGRUPPEN		UNITS		
830	Frequenzweiche Q2500 ACO81/ARC84/CAL84	P.C.B	396-85729.077	
U2500	Basic B. kpl. Q25H 32"/WSRF/120V/M-EPAS	P.C.B	396-88175.056	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (THOS)	P.C.B	396-88319.052	
U8211	Modul-Bedienteil Q2500 Aconda	P.C.B	396-88226.050	
DRUCKSACHEN		OPERATING INSTRUCTIONS		
500	BAN -D-I ACO Q2500	Operating Instructions	233-29377	
502	BAN -NL-F ACO Q2500	Operating Instructions	233-29377.010	
503	BAN -GB-E ACO Q2500	Operating Instructions	233-29377.020	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
GERÄTEBEIPACK		SET SUPPLEMENT		
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control 150 TV arktis	Transmitter	263-87000.060	
VERPACKUNGSMATERIAL		PACKING MATERIAL		
102	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
104	Schutzstreifen	Protective Packing	253-84666.025	
600	Faltschachtel	Packing Case	245-87749.002	
610	Packschalen-Satz 32" Aconda	Cushion-Set	252-87742.050	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
KNÖPFE		BUTTONS		
320	Tastenset für Servicefunktionen schwarz	Button	682-87685.121	
350	Knopf/Netzschalter schwarz	Button	682-86697.002	
GEHÄUSETEILE		CABINET MOUNTING		
101	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
103	Führungsschiene	Guide	553-87855.001	
105	Gehäusefuß farblos	Foot	783-82251.105	
106	Stütze	Support	551-87854.001	
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
114	Filzstreifen 0,5x5x340mm	Felt Strip	414-28825	
115	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	
200	Distanzstück	Clutch Piece	503-24754	
201	EJOT-PT-Schraube 10,0x45 K100x45	Screw	440-19149	
230	Halter/Entmag.	Holder	602-87243.001	
301	EJOT-PT-Schraube KL11,5x40	Screw	440-29047	
311	Magnet D 8x4	Magnet	303-28596	

Aconda 9281ZW**Art.-Nr. 61401.62**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
GEHÄUSETEILE		CABINET MOUNTING		
330	Ölsilikondämpfer	Gear Wheel	616-28668	
331	Schraube EJOT-PT 3,0x8 KB30x8	Screw	440-23640	
710	32Z WSRF W76LTL350X97 (U)	Picture Tube	345-29484	
G100	Gehäuse Light Blue	Cabinet	750-87747.109	I62
G100	Gehäuse Light Green	Cabinet	750-87747.110	G62
G100	Gehäuse Light Silver	Cabinet	750-87747.111	B62
G110	Rückwand platin	Backcover	775-87748.109	
G111	Zwischenstück schwarz	Cover	568-85727.102	
G112	Abdeckung Rückwand platin	Mask	703-87756.109	
G310	Klappe kpl. Light Blue	Cover Plate	706-87745.107	I62
G310	Klappe kpl. Light Green	Cover Plate	706-87745.108	G62
G310	Klappe kpl. Light Silver	Cover Plate	706-87745.109	B62
G311	Scharnier für Klappe	Hinge	573-87744.101	
G350	Zierritter Light Blue	Speaker Grille	708-87746.113	I62
G350	Zierritter Light Green	Speaker Grille	708-87746.114	G62
G350	Zierritter Light Silver	Speaker Grille	708-87746.115	B62
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
SPULEN/LAUTSPRECHER		COILS,SPEAKERS		
800	Lautsprecher 4 Ohm 20W TT (JST)	Loudspeaker	272-88439	
810	Lautspr. 4 Ohm 20W HT	Loudspeaker	272-86411	
L6001	Entmagn.-Spule 32" 16:9/ 33" 4:3	Coil	297-87882.001	
L6002	Spule Rotation m. Lpl. Q25 JST	Coil	297-29299	
ALLGEM. MECHAN. TEILE		COMMON MECHANICAL PARTS		
306	Kabelhalter auf Kühlblech NF	Cable Binding	530-20935	
BUCHSEN/FASSUNGEN		SOCKETS		
N470	Adapter Lautsprecheranschluss Q2500	Plug	321-29382	

Aconda 9372ZP**Art.-Nr. 61402.62**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BAUGRUPPEN		UNITS		
830	Frequenzweiche kpl. Q2000	P.C.B	396-85729.051	
U2500	Basic Board kpl. Q25H 29"/RF/136V/M-EPAS	P.C.B	396-88175.050	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.055	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	
U8211	Modul-Bedienteil Q2500 Aconda	P.C.B	396-88226.050	
DRUCKSACHEN		OPERATING INSTRUCTIONS		
500	BAN -D-I ACO Q2500	Operating Instructions	233-29377	
502	BAN -NL-F ACO Q2500	Operating Instructions	233-29377.010	
503	BAN -GB-E ACO Q2500	Operating Instructions	233-29377.020	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
GERÄTEBEIPACK		SET SUPPLEMENT		
211	Kabelbinder 290x4,8mm	Cable Binding	530-18263	
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control 150 TV arktis	Transmitter	263-87000.060	
VERPACKUNGSMATERIAL		PACKING MATERIAL		
102	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
600	Faltschachtel	Packing Case	245-87908.002	
610	Packschalen-Satz 29" Aconda	Cushion-Set	252-87907.050	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
KNÖPFE		BUTTONS		
320	Tastenset für Servicefunktionen schwarz	Button	682-87685.121	
350	Knopf/Netzschalter schwarz	Button	682-86697.002	
GEHÄUSETEILE		CABINET MOUNTING		
101	Schraube 6-Kant EJOT 7,0x34 / K70x34	Screw	440-28982	
103	Führungsschiene	Guide	553-87855.001	
105	Gehäusefuß schwarz	Foot	783-88016.002	
106	Stütze	Support	551-87854.011	
110	Kabelhalter schwarz	Cable Binding	530-87903.002	
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
115	Filzstreifen 0,5x5x340mm	Felt Strip	414-28825	
200	Distanzstück für Bildrohrbefestigung	Clutch Piece	503-17983	
230	Halter/Entmag.	Holder	602-87243.001	
301	EJOT-PT-Schraube KL11,5x40	Screw	440-29047	
311	Magnet D 8x4	Magnet	303-28596	
710	29Z A68ERF031X044	Picture Tube	345-28884	

Aconda 9372ZP**Art.-Nr. 61402.62**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
GEHÄUSETEILE		CABINET MOUNTING		
G100	Gehäuse hgl.-schwarz vorm.	Cabinet	750-87909.052	L62
G100	Gehäuse Stratos-Metallic vorm.	Cabinet	750-87909.056	H62
G110	Rückwand	Backcover	775-87911.002	
G111	Zwischenst,ck schwarz	Cover	568-85727.102	
G112	Abdeckung Rückwand	Mask	703-87912.002	
G350	Abdeckung Lautsprecher rechts	Mask	703-87913.012	
G351	Abdeckung Lautsprecher links	Mask	703-87913.002	
H1995	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
SPULEN/LAUTSPRECHER		COILS,SPEAKERS		
800	Lautspr.10 Ohm 11W Tiefton	Loudspeaker	272-85892	
810	Lautspr. 8 Ohm 11W	Loudspeaker	272-86074	
L6001	Entmagn.-Spule 29" 4:3	Coil	297-87882.006	
ALLGEM. MECHAN. TEILE		COMMON MECHANICAL PARTS		
305	Clamper	Cable Binding	530-21237	
BUCHSEN/FASSUNGEN		SOCKETS		
N470	Adapter Lautsprecheranschluß Q2500	Plug	321-29382	

Aconda 9581ZW**Art.-Nr. 61404.63**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BAUGRUPPEN		UNITS		
830	Lpl. Frequenzweiche kpl.	P.C.B	396-85729.063	R63
U2500	Basic B. kpl. Q25H 32"/WSRF/136V/M-EPAS	P.C.B	396-88175.055	R63
U2501	Signal Board kpl. Q25H NICAM/PIP/AC3	P.C.B	396-88176.056	R63
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	R63
U8211	Modul-Bedienteil Q2500 Aconda	P.C.B	396-88226.050	R63
DRUCKSACHEN		OPERATING INSTRUCTIONS		
500	BAN -D-I Aconda 9581 Q2500	Operating Instructions	233-29828	R63
502	BAN -NL-F Aconda 9581 Q2500	Operating Instructions	233-29828.010	R63
503	BAN -GB-E Aconda 9581 Q2500	Operating Instructions	233-29828.020	R63
505	BAN -D-I-F-NL-GB-E- Dolby Digital Q25	Operating Instructions	233-29742	R63
540	Service Kurzanleitung Q2500	Service Manual	230-29277	R63
GERÄTEBEIPACK		SET SUPPLEMENT		
700	IR-Fernbedienung Control 10 arktis	Transmitter	263-87000.071	R63
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	R63
H881	Noppenstreifen selbstklebend	Felt Strip	414-29337	R63
VERPACKUNGSMATERIAL		PACKING MATERIAL		
102	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	R63
104	Schutzstreifen	Protective Packing	253-84666.025	R63
600	Faltschachtel	Packing Case	245-87749.002	R63
610	Packschalen-Satz 32" Aconda	Cushion-Set	252-87742.050	R63
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	R63
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	R63
KNÖPFE		BUTTONS		
320	Tastenset für Servicefunktionen schwarz	Button	682-87685.121	R63
350	Knopf/Netzschalter schwarz	Button	682-86697.002	R63
GEHÄUSETEILE		CABINET MOUNTING		
101	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	R63
103	Führungsschiene	Guide	553-87855.001	R63
105	Gehäusefuß farblos	Foot	783-82251.105	R63
106	Stütze	Support	551-87854.001	R63
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	R63
114	Filzstreifen 0,5x5x340mm	Felt Strip	414-28825	R63
115	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	R63
200	Distanzstück	Clutch Piece	503-24754	R63
201	EJOT-PT-Schraube 10,0x45 K100x45	Screw	440-19149	R63
230	Halter/Entmag.	Holder	602-87243.001	R63

Aconda 9581ZW**Art.-Nr. 61404.63**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
GEHÄUSETEILE		CABINET MOUNTING		
301	EJOT-PT-Schraube KL11,5x40	Screw	440-29047	R63
311	Magnet D 8x4	Magnet	303-28596	R63
330	Ölsilikondämpfer	Gear Wheel	616-28668	R63
331	Schraube EJOT-PT 3,0x8 KB30x8	Screw	440-23640	R63
710	32Z W76ERF042X044	Picture Tube	345-29618	R63
G100	Gehäuse Stratos-Metallic	Cabinet	750-87747.028	R63
G110	Rückwand Stratos-Metallic	Backcover	775-87748.104	R63
G111	Zwischenstück schwarz	Cover	568-85727.102	R63
G310	Klappe kpl. Stratos-Metallic	Cover Plate	706-87745.106	R63
G311	Scharnier für Klappe	Hinge	573-87744.101	R63
G350	Ziergitter Stratos-Metallic	Speaker Grille	708-87746.112	R63
H1996	Abdeckung SCART m. IR-Link vorm. Q2500	Mask	703-87728.051	R63
SPULEN/LAUTSPRECHER		COILS,SPEAKERS		
800	Lautspr. Z=4 Ohm 20W TT	Loudspeaker	272-87846	R63
810	Lautspr. 4 Ohm 20W HT	Loudspeaker	272-86411	R63
L6001	Entmagn.-Spule 32" 16:9/ 33" 4:3	Coil	297-87882.001	R63
L6002	Spule Rotation m. Lpl. Q25 JST	Coil	297-29299	R63
ALLGEM. MECHAN. TEILE		COMMON MECHANICAL PARTS		
306	Kabelhalter auf Kühlblech NF	Cable Binding	530-20935	R63
H475	Clamper	Cable Binding	530-20809	R63
BUCHSEN/FASSUNGEN		SOCKETS		
N470	Adapter Lautsprecheranschlufß Q2500	Plug	321-29382	R63

Aconda 9381ZW**Art.-Nr. 61405.52/62**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BAUGRUPPEN		UNITS		
830	Lpl. Frequenzweiche kpl.	P.C.B	396-85729.063	H62
830	Lpl. Frequenzweiche kpl.	P.C.B	396-85729.063	L62
830	Frequenzweiche Q2500 ACO81/ARC84/CAL84	P.C.B	396-85729.077	H52
830	Frequenzweiche Q2500 ACO81/ARC84/CAL84	P.C.B	396-85729.077	L52
U2500	Basic B. kpl. Q25H 32"WSRF/136V/M-EPAS	P.C.B	396-88175.055	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	L62
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.055	H52
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.055	L52
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	
U501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	H62
U8211	Modul-Bedienteil Q2500 Aconda	P.C.B	396-88226.050	
DRUCKSACHEN		OPERATING INSTRUCTIONS		
500	BAN -D-I ACO Q2500	Operating Instructions	233-29377	H62
500	BAN -D-I ACO Q2500	Operating Instructions	233-29377	L62
502	BAN -NL-F ACO Q2500	Operating Instructions	233-29377.010	H62
502	BAN -NL-F ACO Q2500	Operating Instructions	233-29377.010	L62
503	BAN -GB-E ACO Q2500	Operating Instructions	233-29377.020	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
GERÄTEBEIPACK		SET SUPPLEMENT		
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control 150 TV arktis	Transmitter	263-87000.060	
VERPACKUNGSMATERIAL		PACKING MATERIAL		
102	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
104	Schutzstreifen	Protective Packing	253-84666.025	
600	Faltschachtel	Packing Case	245-87749.002	
610	Packschalen-Satz 32" Aconda	Cushion-Set	252-87742.050	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
KNÖPFE		BUTTONS		
320	Tastenset für Servicefunktionen schwarz	Button	682-87685.121	
350	Knopf/Netzschalter schwarz	Button	682-86697.002	
GEHÄUSETEILE		CABINET MOUNTING		
101	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
103	Führungsschiene	Guide	553-87855.001	
105	Gehäusefuß farblos	Foot	783-82251.105	
106	Stütze	Support	551-87854.001	

Aconda 9381ZW**Art.-Nr. 61405.52/62**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
GEHÄUSETEILE		CABINET MOUNTING		
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
114	Filzstreifen 0,5x5x340mm	Felt Strip	414-28825	
115	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	
200	Distanzstück	Clutch Piece	503-24754	
201	EJOT-PT-Schraube 10,0x45 K100x45	Screw	440-19149	
230	Halter/Entmag.	Holder	602-87243.001	
301	EJOT-PT-Schraube KL11,5x40	Screw	440-29047	
311	Magnet D 8x4	Magnet	303-28596	
330	Ölsilikondämpfer	Gear Wheel	616-28668	
331	Schraube EJOT-PT 3,0x8 KB30x8	Screw	440-23640	
710	32Z W76ERF042X044	Picture Tube	345-29618	
G100	Gehäuse hgl.-schwarz	Cabinet	750-87747.102	L52
G100	Gehäuse hgl.-schwarz	Cabinet	750-87747.102	L62
G100	Gehäuse Stratos-Metallic	Cabinet	750-87747.106	H52
G100	Gehäuse Stratos-Metallic	Cabinet	750-87747.106	H62
G110	Rückwand	Backcover	775-87748.102	
G111	Zwischenstück schwarz	Cover	568-85727.102	
G112	Abdeckung Rückwand	Mask	703-87756.102	
G310	Klappe kpl. hgl.-schwarz	Cover Plate	706-87745.101	L52
G310	Klappe kpl. hgl.-schwarz	Cover Plate	706-87745.101	L62
G310	Klappe kpl. Stratos-Metallic	Cover Plate	706-87745.106	H52
G310	Klappe kpl. Stratos-Metallic	Cover Plate	706-87745.106	H62
G311	Scharnier für Klappe	Hinge	573-87744.101	
G350	Zierritter	Speaker Grille	708-87746.102	
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
SPULEN/LAUTSPRECHER		COILS,SPEAKERS		
800	Lautspr. Z=4 Ohm 20W TT	Loudspeaker	272-87846	H62
800	Lautspr. Z=4 Ohm 20W TT	Loudspeaker	272-87846	L62
800	Lautsprecher 4 Ohm 20W TT (JST)	Loudspeaker	272-88439	H52
800	Lautsprecher 4 Ohm 20W TT (JST)	Loudspeaker	272-88439	L52
810	Lautspr. 4 Ohm 20W HT	Loudspeaker	272-86411	
L6001	Entmagn.-Spule 32" 16:9/ 33" 4:3	Coil	297-87882.001	
L6002	Spule Rotation m. Lpl. Q25 JST	Coil	297-29299	
ALLGEM. MECHAN. TEILE		COMMON MECHANICAL PARTS		
305	Clamper	Cable Binding	530-21237	H62
305	Clamper	Cable Binding	530-21237	L62

Aconda 9381ZW**Art.-Nr. 61405.52/62**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	ALLGEM. MECHAN. TEILE	COMMON MECHANICAL PARTS		
306	Kabelhalter auf Kühlblech NF	Cable Binding	530-20935	
H475	Clamper	Cable Binding	530-20809	H52
H475	Clamper	Cable Binding	530-20809	H62
H8003	Silikon-Glasseeidenschlauch 14,0x0,7	Insulating Tube	184-29885	H52
H8003	Silikon-Glasseeidenschlauch 14,0x0,7	Insulating Tube	184-29885	L52

Aconda 9381ZW**Art.-Nr. 61405.52/62**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BUCHSEN/FASSUNGEN	SOCKETS		
N470	Adapter Lautsprecheranschluß Q2500	Plug	321-29382	

Aconda 93102ZW**Art.-Nr. 61406.63**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BAUGRUPPEN		UNITS		
U2500	Basic B. kpl. Q25H 40"WSSF/136V/M-EPAS	P.C.B	396-88175.052	
U2501	Signal Board kpl. Q25H NICAM/PIP/AC3	P.C.B	396-88176.056	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 ACO 93102	P.C.B	396-88319.051	
U8211	Modul-Bedienteil Q2500 Aconda	P.C.B	396-88226.050	
DRUCKSACHEN		OPERATING INSTRUCTIONS		
500	BAN -D-I ACO Q2500	Operating Instructions	233-29377	
502	BAN -NL-F ACO Q2500	Operating Instructions	233-29377.010	
503	BAN -GB-E ACO Q2500	Operating Instructions	233-29377.020	
505	BAN -D-I-F-NL-GB-E- Dolby Digital Q25	Operating Instructions	233-29742	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
GERÄTEBEIPACK		SET SUPPLEMENT		
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control 150 TV arktis	Transmitter	263-87000.060	
VERPACKUNGSMATERIAL		PACKING MATERIAL		
102	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
600	Schachtel Aconda 93102	Packing Case	245-88322.002	
601	Flachpalette (Einweg) Aconda 93102	Wood Foot Rack	259-88483.001	
602	PP-Band 15,5x0,55mm sw-gepr.	Accessories	256-18061	
610	Verpackungsformteil Aconda 93102	Cushion-Set	252-88323.050	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
KNÖPFE		BUTTONS		
320	Tastenset für Servicefunktionen schwarz	Button	682-87685.121	
350	Knopf/Netzschalter schwarz	Button	682-86697.002	
GEHÄUSETEILE		CABINET MOUNTING		
101	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
103	Führungsschiene	Guide	553-87855.021	
104	Filzstreifen für Rückwand	Felt Strip	414-20742	
105	Gehäusefuß schwarz	Foot	783-88016.022	
106	Stütze	Support	551-87854.011	
108	Stopfen f. Lautsprecher-Box Aconda 93102	Stopper	506-29343	
109	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	
112	Filzzuschnitt 30x5x1 für RW	Felt Strip	414-27413	
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
114	Filzstreifen 0,5x5x340mm	Felt Strip	414-28825	
115	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	

Aconda 93102ZW**Art.-Nr. 61406.63**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
GEHÄUSETEILE		CABINET MOUNTING		
121	Schraube K5,0x20,0 Torx T25 WN5451	Screw	440-29371	
122	Zugentlastung f. Netzkabel Aconda 93102	Cable Binding	530-29355	
123	Metallplatte Aconda 93102	Spring Contact	309-29360	
301	EJOT-PT-Schraube KL11,5x40	Screw	440-29047	
311	Magnet D 8x4	Magnet	303-28596	
330	Ölsilikondämpfer	Gear Wheel	616-28668	
331	Schraube EJOT-PT 3,0x8 KB30x8	Screw	440-23640	
710	40Z W97AJG14X08 (38V)	Picture Tube	345-28988	
G100	Gehäuse Stratos-Metallic Aconda 93102	Cabinet	750-88237.006	H63
G100	Gehäuse hgl.-schwarz Aconda 93102	Cabinet	750-88237.012	L63
G110	Rückwand graphit Aconda 93102	Backcover	775-88238.004	
G111	Zwischenstück schwarz	Cover	568-85727.102	
G112	Abdeckung Rückwand graphit Aconda 93102	Mask	703-88239.004	
G310	Klappe kpl. hgl.-schwarz	Cover Plate	706-87745.101	L63
G310	Klappe kpl. Stratos-Metallic	Cover Plate	706-87745.106	H63
G311	Scharnier für Klappe Aconda 93102	Hinge	573-88241.001	
G350	Schallwand Aconda 93102 vorm. Q2500	Front Cover	776-88242.051	
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
SPULEN/LAUTSPRECHER		COILS,SPEAKERS		
L6001	Entmagn.-Spule 38"	Coil	297-87882.007	
L6002	Spule Rotation m. Lpl. Q25 JST	Coil	297-29299	
ALLGEM. MECHAN. TEILE		COMMON MECHANICAL PARTS		
305	Clamper	Cable Binding	530-21237	
306	Kabelhalter auf Kühlblech NF	Cable Binding	530-20935	
BUCHSEN/FASSUNGEN		SOCKETS		
N470	Adapter Lautsprecheranschluß Q2500	Plug	321-29382	

Articos 32

Art.-Nr. 61450.62

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	UNITS		
300	Stand-by Netzteil kpl. Articos	P.C.B	396-88117.050	
U2500	Basic B. kpl. Q2500 32"/WSRF/136V/M-EPAS	P.C.B	396-88175.055	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	
	DRUCKSACHEN	OPERATING INSTRUCTIONS		
633	BAN -D-I Articos 32 / Aconda 9581 Q2500	Operating Instructions	233-29792	
634	BAN -NL-F Articos 32 / Aconda 9581 Q2500	Operating Instructions	233-29792.010	
635	BAN -GB-E Articos 32 / Aconda 9581 Q2500	Operating Instructions	233-29792.020	
636	Service Kurzanleitung Q2500	Service Manual	230-29277	
639	Rückantwortkarte LOEWE 1 D-I-GB-F-E-NL	Indicating Sheet	240-28786.001	
	GERÄTEBEIPACK	SET SUPPLEMENT		
602	Filterscheibe Articos	Window	666-88188.002	
642	IR-Fernbedienung Control 10 arktis	Transmitter	263-87000.071	
644	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
645	Reinigungsmittel 100ml	Detergent	209-29719	
646	Reinigungsset - Tuch+Handschuhe	Protective Covering	254-29720	
	VERPACKUNGSMATERIAL	PACKING MATERIAL		
600	Faltschachtel Articos 32	Packing Case	245-88184.002	
610	Packschalen-Satz Articos 32	Cushion-Set	252-88192.050	
611	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
612	Schutzstreifen	Protective Packing	253-84666.025	
630	Verpackungskarton für BAN+FB Articos 32	Packing Case	245-88422.002	
631	Einlage f. Verp.-Beipack	Accessories	256-86784.001	
643	PE-Schutzeinlage 265x335x1	Protective Packing	253-26221	
	VERBINDUNGSLEITUNG	CONNECTING CABLES		
N8003	Netzkabel Dr. 2250mm 0,75 SW JST	Power Cord	170-29158.001	
	GEHÄUSETEILE	CABINET MOUNTING		
100	Fuß Aluminium Articos	Foot	783-88215.002	
101	Schraube K5,0x20,0 Torx T25 WN5451	Screw	440-29371	
102	Formstanzteil 38x20mm	Damping Rubber	406-29728	
103	Schallwand Articos vormontiert	Front Cover	776-88195.050	
106	Stütze	Support	551-87854.031	
109	Filzstreifen für Rückwand	Felt Strip	414-20742	
110	Kabelhalter schwarz	Cable Binding	530-87903.002	
112	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	

Articos 32

Art.-Nr. 61450.62

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEHÄUSETEILE	CABINET MOUNTING		
114	Filzstreifen	Felt Strip	414-25204	
200	Distanzstück	Clutch Piece	503-24754	
201	EJOT-PT-Schraube 10,0x45 K100x45	Screw	440-19149	
230	Halter/Entmag.	Holder	602-87243.001	
603	Filzstreifen 5x1,2x385,5mm	Felt Strip	414-29740.001	
604	Filzstreifen 5x1,2x692,5mm	Felt Strip	414-29740.002	
710	32Z W76ERF042X044	Picture Tube	345-29618	
G100	Gehäuse unlackiert Articos	Cabinet	750-88191.001	
G101	Frontblende basalt-hgl. Articos vorm.	Cabinet	757-88189.055	M62
G101	Frontblende platin Articos vormontiert	Cabinet	757-88189.059	A62
G102	Bedienteilträger basalt-hgl. Arti. vorm.	Supporter	541-88171.055	M62
G102	Bedienteilträger platin Articos vorm.	Supporter	541-88171.059	A62
G110	Rückwand platin Articos	Backcover	775-88194.009	A62
G110	Rückwand basalt-hgl. Articos	Backcover	775-88194.015	M62
G111	Zwischenstück schwarz	Cover	568-85727.102	
G112	Abdeckung Rückwand platin Articos	Mask	703-88187.009	A62
G112	Abdeckung Rückwand basalt-hgl. Articos	Mask	703-88187.015	M62
H1996	Abdeckung SCART m. IR-Link vorm. Articos	Mask	703-87728.051	
	SPULEN/LAUTSPRECHER	COILS,SPEAKERS		
L6001	Entmagn.-Spule 32" 16:9/ 33" 4:3	Coil	297-87882.001	
L6002	Korrekturspule m. Rotationsmodul Q25	Coil	297-29299	
	BUCHSEN/FASSUNGEN	SOCKETS		
N470	Adapter Lautsprecheranschlufi Q2500	Plug	321-29382	

Xelos 5981TV-M**Art.-Nr. 61465.62**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BAUGRUPPEN		UNITS		
970	EBS VGA Q2500	Scaffolding Access.	291-87808.006	
U2500	Basic B. kpl. Q25H 32"/WSSF/136V/M-EPAS	P.C.B	396-88175.054	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	
U8211	Modul-Bedienteil Q25 Xelos 61/70/81	P.C.B	396-88225.053	
DRUCKSACHEN		OPERATING INSTRUCTIONS		
500	BAN -D-I Xelos TV-M/O Q2500	Operating Instructions	233-29214	
502	BAN -NL-F Xelos TV-M/O Q2500	Operating Instructions	233-29214.010	
503	BAN -GB-E Xelos TV-M/O Q2500	Operating Instructions	233-29214.020	
506	BAN Control für Set-TOP-Boxen	Indicating Sheet	240-28833	
507	Hinweisblatt Noppenstreifen	Indicating Sheet	240-29994	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
GERÄTEBEIPACK		SET SUPPLEMENT		
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control MM/D-Box arktis	Transmitter	263-87000.091	
VERPACKUNGSMATERIAL		PACKING MATERIAL		
600	Verpackungskarton	Packing Case	245-87406.002	
610	Packschalen-Satz 32" Xelos	Cushion-Set	252-87407.050	
611	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
612	Schutzstreifen	Protective Packing	253-84666.025	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
VERBINDUNGSLEITUNG		CONNECTING CABLES		
N8003	Netzkabel Dr. 2250mm 0,75 SW JST	Power Cord	170-29158.001	
KNÖPFE		BUTTONS		
310	Knopf/Netzschalter	Button	682-87103.001	
G330	Knopf/Taster grau	Button	682-87138.001	A62
G330	Knopf/Taster schwarz	Button	682-87138.002	L62
GEHÄUSETEILE		CABINET MOUNTING		
112	Schraube 40x20 Torx WN1451	Screw	440-25382	
200	Distanzstück	Clutch Piece	503-24754	
201	EJOT-PT-Schraube 10,0x45 K100x45	Screw	440-19149	
230	Halter/Entmag.	Holder	602-87243.001	
710	32Z W76ESF031X44	Picture Tube	345-26377	
G100	32" Gehäuse schwarz MM vorm. Q2500	Cabinet	750-87399.058	L62
G100	32" Gehäuse platin MM vorm. Q2500	Cabinet	750-87399.059	A62

Xelos 5981TV-M**Art.-Nr. 61465.62**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
GEHfUSETEILE		CABINET MOUNTING		
G101	Zwischenstück natur	Cover	568-85727.101	A62
G101	Zwischenstück schwarz	Cover	568-85727.102	L62
G110	Rückwand platin 32"	Backcover	775-87401.019	A62
G110	Rückwand schwarz 32"	Backcover	775-87401.112	L62
G111	Zwischenstück natur	Cover	568-85727.101	A62
G111	Zwischenstück schwarz	Cover	568-85727.102	L62
G112	Abdeckung / Rückwand schwarz	Mask	703-87403.002	L62
G112	Abdeckung/Rückwand platin	Mask	703-87403.009	A62
G331	Fenster	Window	666-87139.001	
H1995	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
SPULEN/LAUTSPRECHER		COILS,SPEAKERS		
L6001	Entmagn.-Spule 32" 16:9/ 33" 4:3	Coil	297-87882.001	
L6002	Spule Rotation m. Lpl. Q25 JST	Coil	297-29299	
ALLGEM. MECHAN. TEILE		COMMON MECHANICAL PARTS		
192	Clamper	Cable Binding	530-21237	
BUCHSEN/FASSUNGEN		SOCKETS		
N470	Adapter Lautsprecheranschlufi Q2500	Plug	321-29382	
GEHÄUSETEILE 87399.058/059		CABINET MOUNTING 87399.058/059		
10	FFS-Gehäuse mit Ziergitter schwarz 32"	Cabinet	750-87399.032	058
10	Gehäuse mit Ziergitter platin 32"	Cabinet	750-87399039	059
40	Träger/Bedienung arktis	Supporter	541-87102.001	059
40	Träger/Bedienung schwarz	Supporter	541-87102.002	058
50	Abdeckklappe für Lautsprecher am Geh. unten	Mask	703-84577.101	
70	Haltewinkel	Angle	596-87404.001	
SPULEN/LAUTSPRECHER		COILS,SPEAKERS		
20	Lautsprecher 4 Ohm 20W TT (JST)	Loudspeaker	272-88439	

Xelos 5970TV-M**Art.-Nr. 61466.62**

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
BAUGRUPPEN		UNITS		
970	EBS VGA Q2500	Scaffolding Access.	291-87808.006	
U2500	Basic B. kpl. Q25H 28"/WSSF/136V/M-EPAS	P.C.B	396-88175.053	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	
U8211	Modul-Bedienteil Q25 Xelos 61/70/81	P.C.B	396-88225.053	
DRUCKSACHEN		OPERATING INSTRUCTIONS		
500	BAN -D-I Xelos TV-M/O Q2500	Operating Instructions	233-29214	
502	BAN -NL-F Xelos TV-M/O Q2500	Operating Instructions	233-29214.010	
503	BAN -GB-E Xelos TV-M/O Q2500	Operating Instructions	233-29214.020	
506	BAN Control für SET-TOP-Boxen	Indicating Sheet	240-28833	
507	Hinweisblatt Noppenstreifen	Indicating Sheet	240-29994	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
GERÄTEBEIPACK		SET SUPPLEMENT		
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control MM/D-Box arktis	Transmitter	263-87000.091	
VERPACKUNGSMATERIAL		PACKING MATERIAL		
600	Verpackungskarton	Packing Case	245-87106.002	
610	Packschalen-Satz 28" Xelos	Cushion-Set	252-87107.050	
611	Schutzstreifen	Protective Packing	253-84666.025	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
VERBINDUNGSLEITUNG		CONNECTING CABLES		
N8003	Netzkabel Dr. 2250mm 0,75 SW JST	Power Cord	170-29158.001	
KNÖPFE		BUTTONS		
310	Knopf/Netzschalter	Button	682-87103.001	
G330	Knopf/Taster grau	Button	682-87138.001	A62
G330	Knopf/Taster schwarz	Button	682-87138.002	L62
GEHÄUSETEILE		CABINET MOUNTING		
100	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	
110	Filzstreifen	Felt Strip	414-25204	
112	Schraube 40x20 Torx WN1451	Screw	440-25382	
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
200	Distanzstück für Bildrohrbefestigung	Clutch Piece	503-17983	
201	Schraube 7x40 vzkt. für Bildrohrbefestigung	Screw	440-18058	
230	Halter/Entmag.	Holder	602-87243.001	
709	Konvergenz-Minipol	Deflection Unit	278-26996	

Xelos 5970TV-M**Art.-Nr. 61466.62**

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GEHÄUSETEILE		CABINET MOUNTING		
G100	564 28" Gehäuse sw. MM vorm.	Cabinet	750-87099.052	L62
G100	28" Gehäuse platin MM vorm.	Cabinet	750-87099.055	A62
G101	Zwischenstück natur	Cover	568-85727.101	A62
G101	Zwischenstück schwarz	Cover	568-85727.102	L62
G110	Rückwand platin 28"	Backcover	775-87101.019	A62
G110	Rückwand schwarz 28"	Backcover	775-87101.112	L62
G111	Zwischenstück natur	Cover	568-85727.101	A62
G111	Zwischenstück schwarz	Cover	568-85727.102	L62
G112	Abdeckung/Rückwand schwarz	Mask	703-87105.002	L62
G112	Abdeckung/Rückwand platin	Mask	703-87105.009	A62
G331	Fenster	Window	666-87139.001	
G350	Frontabdeckung schw. Lautspr.+Bedienteil	Mask	703-87104.002	L62
G350	Frontabdeckung platin Lautspr.+Bedienteil	Mask	703-87104.009	A62
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
V3001	28Z W66ESF032X44	Picture Tube	345-27377	
SPULEN/LAUTSPRECHER		COILS,SPEAKERS		
L6001	Entmagn.-Spule 28/29" 4:3, 28" 16:9	Coil	297-87882.003	
ALLGEM. MECHAN. TEILE		COMMON MECHANICAL PARTS		
192	Clamper	Cable Binding	530-21237	
BUCHSEN/FASSUNGEN		SOCKETS		
N470	Adapter Lautsprecheranschluf Q2500	Plug	321-29382	

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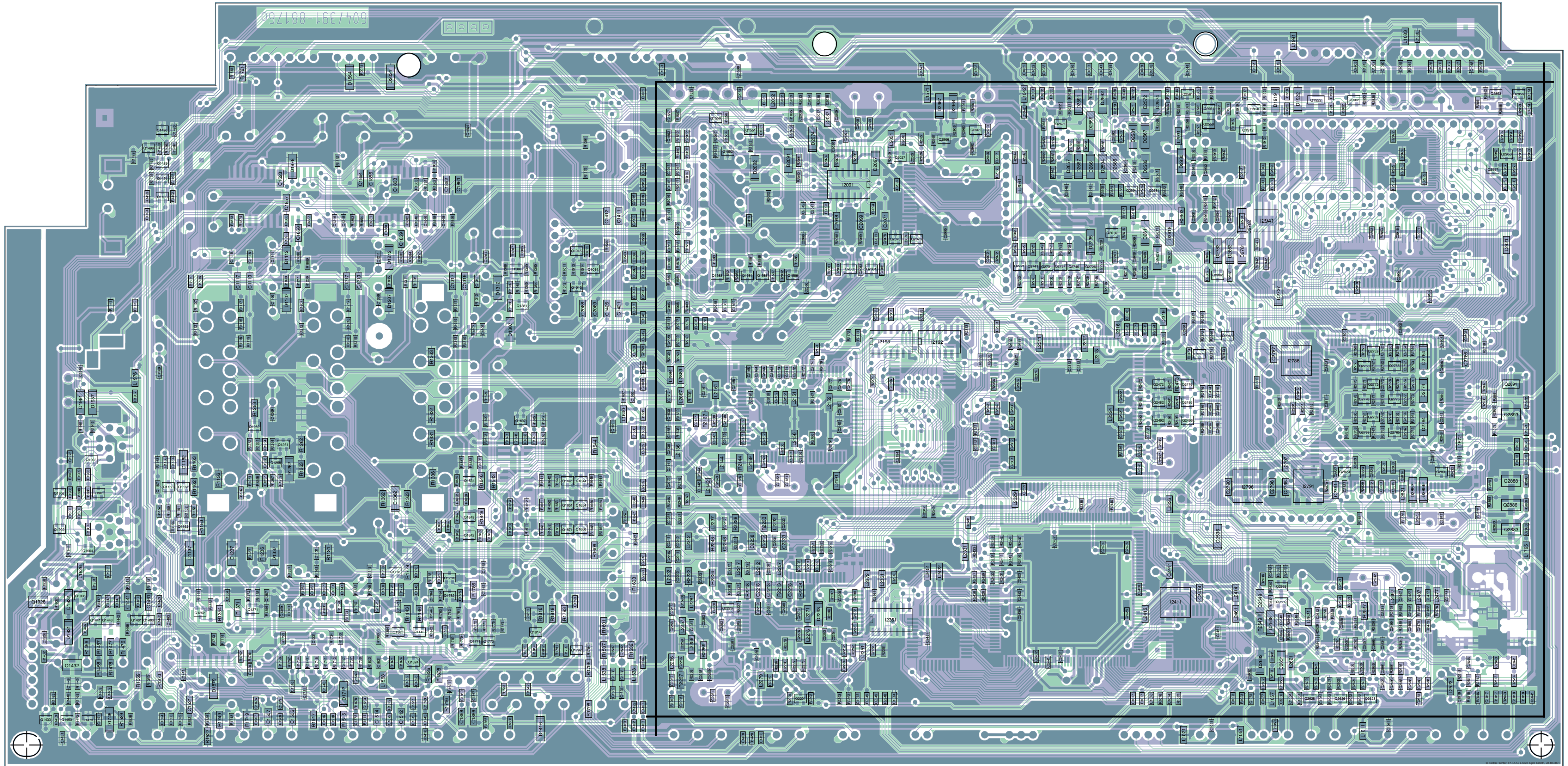
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1 Introduction

The Q 2500 chassis is a further development of the tried and tested 100 Hz Q 2400 chassis. The modular design, dimensions and layout have been retained.

In order to improve picture performance even further, several circuit components have either been modified or newly added. For sound signals, IF processing in the main receiver unit is now entirely digital.

The Q 2500 chassis is available in three different versions, Q 2500/H (High End), Q 2500/M (Medium) and Q 2500/B (Basic). The signal board is different for all three versions. It has different equipment in certain areas owing to the different power spectrum of the three versions. All H/M and B signal board versions are electrically interchangeable. Due to the incorporation of 2 or 3 AV sockets (the back of the TV set does not fit) they are not mechanically compatible. Except for the signal board there is no differentiation with respect to all other components for the different versions – High End, Medium and Basic. The Q 2500 chassis therefore supersedes the Q 2400 and Q 4140 chassis completely.

Because of this concept it is now possible to fit a DVB upgrade kit to all 100 Hz TV sets – from the Contur to the Aconda. So far this has only been possible for sets with the Q 2400 chassis and not for sets with the Q 4140 chassis.

The following features have been retained from the previous chassis:

- 8 bit digital signal processing
- ACP (Automatic Channel Programming) for fully automatic programming of stations and sorting of cable and SAT reception, including an update function.

- child protection security-plus with secret code.
- Sharpness control, photo CD circuit and comb filter (S-PAL).
- SCS (Sharpness Control System) for a picture-dependent velocity modulation of the horizontal (line) sweep.
- DTI Plus (Digital Transient Improvement) for colour edge sharpening.
- 576-line still picture
- Adjustable noise suppression DNC (Digital Noise Control)
- Suppression of interline flicker DLC (Digital Lineflicker Control).
- Digital Line Interpolation (DLI) for full frame picture display for PALplus and also in all zoom modes.
- Digital Motion Interpolation (DMI) ensures continuous movement over all single frame pictures.
- Automatic Movie Detection (AMD) for switching to wide screen format in PAL standard on 16:9 units.
- Automatic PALplus recognition and format switching for 16:9 units.
- Digital Scene Control (DSC) for improved grey scales.
- Various switching modes (4:3, Cinema, Zoom, 16:9 and Panorama Mode for 16:9 units).
- Automatic Volume Control (AVC) for adjusting the volume between different channels and during commercial breaks
- On the front: Headphone output and input with S terminals and three cinch sockets.

- Copy function for re-recording between different inputs and outputs (also in standby mode), and during TV programmes.
- Internal clock synchronized with Teletext.
- EPG function (electronic programme guide).
- Recording timer for video recorder and SAT standby function.
- Operation of Loewe video recorders via the menu.
- Switch-off automation and timer.
- In 81 cm sets a rotary panel is used in order to compensate for the earth's magnetic field. This prevents distortion of the picture no matter where the set is placed.
- Personal Control System (PCS): operation tailored to individual customer requirements. The most frequently used functions may be assigned to four buttons of the remote control. Additionally, the operating manual may be viewed on the screen – On Screen Display (OSD). This includes help instructions on functions currently used, information on the remote control functions and an index, which enables immediate implementation of functions. It is also possible to set limitations to the scope of operation according to customer requirements. The user may, for example, be prevented from making changes to particular settings.
- Automatic Gain Control (AGC) for all video signals shown in the main picture.
- The RGB signals are no longer converted to analogue Y/C signals but are directly digitised instead.
- An Audio-In socket to which, for example, an external digital radio receiver may be connected.
- Some models, e.g. Aconda, may be upgraded

- A Dolby Digital Module can be installed in model versions H and M.
- The EAROM and the DVB software may be directly written to via an external V 24 service interface using a PC and service adapter.

The following features are completely new:

- Depending on version, either two or three AV sockets.
- Depending on version, a Teletext memory with 3000 pages (with active EPG function 2000 pages).
- An own radio menu, accessible over the "speaker symbol" on the remote control.
- Improved Digital Movie Mode (DMM). Feature films are recognized safely. Therefore, accidental switching to camera mode is prevented. Switching effects do not occur anymore.

The following circuit descriptions have been subdivided according to the individual modules. Deviation from this scheme occurs occasionally in order to emphasize relations between circuits more effectively. All component positions in the circuit diagrams are identified by four figures. For the signal board the fully equipped version H is explained. For versions M and B only the differences are noted.

The upgrade kits are explained in a separate circuit description.

1.1 Foundations of 100 Hz technology

1.1.1 Prerequisites for 100 Hz

In order to double the picture frequency at the receiver, the signals have to be read into the relevant memory blocks and then read out twice at double rate.

The following prerequisites must be met:

- The signals need to be digitised.
- The memory modules require at least 3 Mbits storage capacity.
- The software must be able to run a controller, which in turn monitors the read-in and read-out functioning of the memory.
- Suitable frequency-stabilized oscillators for generating the clock frequency must be provided.
- The drive signals for the output stages, line and field deflection, and the E/W correction must also be at double frequency.
- The power output stages for deflection, as well as the deflector itself, need to be designed for the higher frequency and the resulting higher currents.
- The RGB output stages need to be able to process the doubled bandwidth.

1.1.2 100 Hz display modes

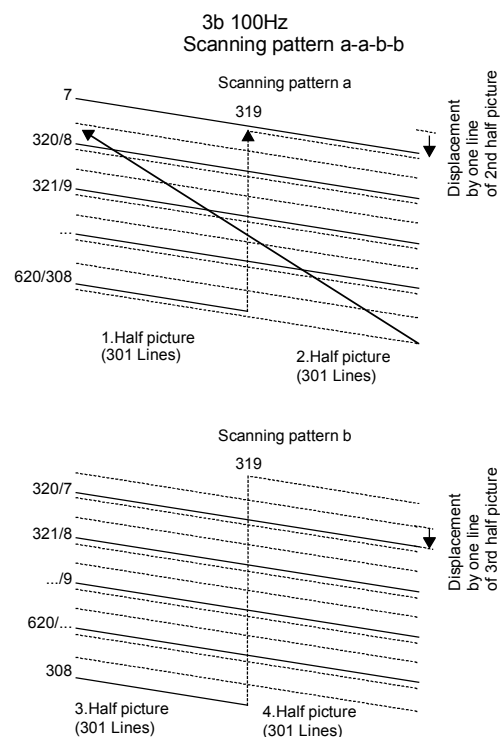
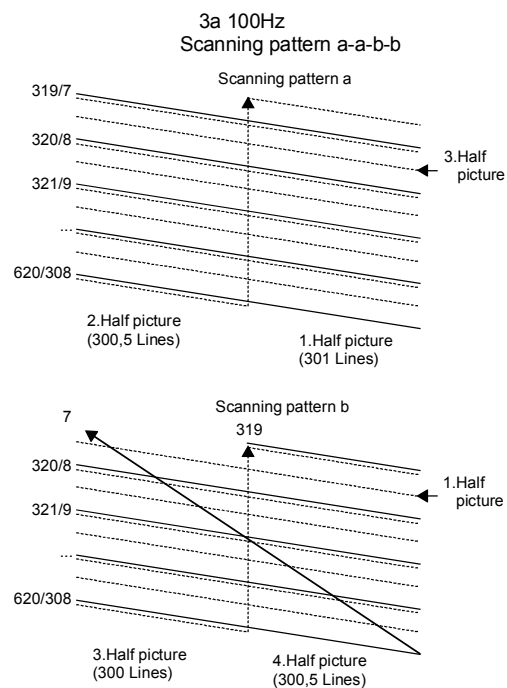
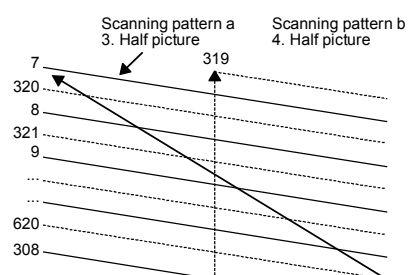
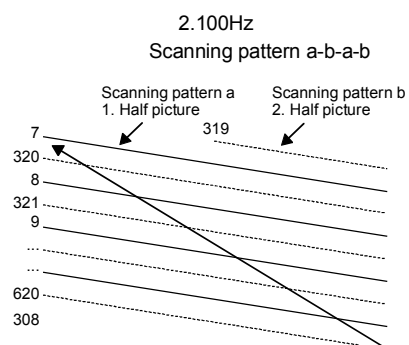
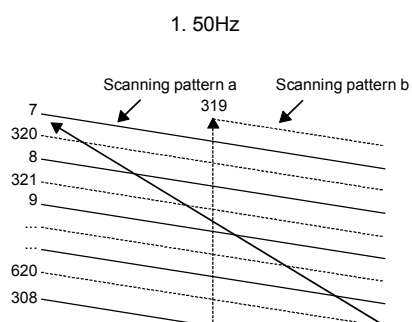
When examining display modes the deflection raster and the video raster need to be considered together. In 50 hz operation, the two single-frame pictures A and B are written to the scanning system 'a' and 'b', i.e. every second line of frame A and the intermediate lines of B. This is achieved in that the flyback of 'a' begins in the middle of a line. Trace 'b' starts also in the middle of a line but is written to the end of a complete line. The next trace 'a' starts again at the beginning of a line. The trace time, however, is always the same.

1.1.3 Mode AABB

The simplest case of 100 hz operation involves a simple doubling of single-frame picture display, i.e. field A is displayed twice consecutively followed by field B (AABB).

To achieve this the deflection raster must be modified so that 'a' is written twice followed by 'b' (aabb). Theoretically, this can be accomplished in two ways. Firstly, by adjusting the flyback's starting time for the 4 single frames. A half-line more is written for 'a1' and a half-line less in for the third field. In practice, such a scheme would be quite difficult to implement. In comparison, the second possibility is easier to achieve. This involves shifting the 2nd and 3rd fields (a2 and b1). This can be accomplished by adjusting the current through the deflector by modifying the base resistance. This produces the same time interval for all traces over all fields

Deflection 100Hz



For AA and BB display, delay lines must ensure that the lines of the 1st and 2nd, and 3rd and 4th fields contain the same picture information when superimposed on one another. This mode of display allows for very effective reduction of large-area flicker. A reduction of interline flicker is, however, not possible, because intermediate lines are only traced after 20ms.

1.1.4 Mode ABAB

This mode, together with the two described below, are only possible in conjunction with a second single-frame picture memory because of the alternating display of A and B. The deflection must also operate in 'abab' raster form. In this display mode, the signals are not modified during deflection or image processing operations. In this case, both interline flicker and large area-flicker can be reduced. However, jerking effects in moving images can arise. This form of display is only suitable for signals where an image is formed from two fields between which there is no relative movement. This mode is therefore of interest only for "Photo CD" or cinema scope films in PALplus.

Reduction of interline flicker without movement interpolation (DLC)

Memory 1	Memory 1 retarded	Memory 2	Output	Deflection Scanning pattern
A	A ^v	B	A	a
A	A ^v	A	A'	b
B	B ^v	A	B'	a
B	B ^v	B	B	b
A	A ^v	B	A	a

1.1.5 Mode AA'B'B

In this display mode two single-frame pictures, A' and B', are calculated. By using an interpolation filter the current single-frame, the current single-frame delayed by one line and the

signal delayed by one single-frame are compared with one another. If deviations are de-

Interpolation example

Memory 1	10	10	10	x x x
Memory 1 retarded	10	10	9	x x x
Memory 2	10	8	8	x x x
Output	10	10	9	x x x

tected in one of the signals, this signal is eliminated and the values that agree in the other two signals are retained. If all three signals vary, an average is formed.

The deflection proceeds as sweep 'abab'. The calculated A' and B' are written to shifted scanning system of the 2nd and 3rd single frames. A and B are written to the non-shifted system of frames 1 and 4.

This mode is suitable for the display of horizontal motion between frames. Only small jerking effects arise between movements.

The mode is used to suppress interline flicker in normal TV operation.

1.1.6 Mode AA*BB*

In this display mode with respect to the calculated frames A* and B*, the movement between the original frames A and B, and between B and the next A are taken into account. This movement interpolation (DMI – Digital Motion Interpolation) takes into account both horizontal and vertical movements which cover several lines. This means that when suppressing interline flicker, continuous movement over all frames is achieved.

For full frame pictures (films) it is also assured that no movement between two single-frame pictures takes place (DMM – Digital Movie Mode).

In this display mode the deflection is also 'abab'.

Movement interpolation



Picture 1



Picture 2



Picture 3



Picture 1



Picture 1*



Picture 2



Picture 2*



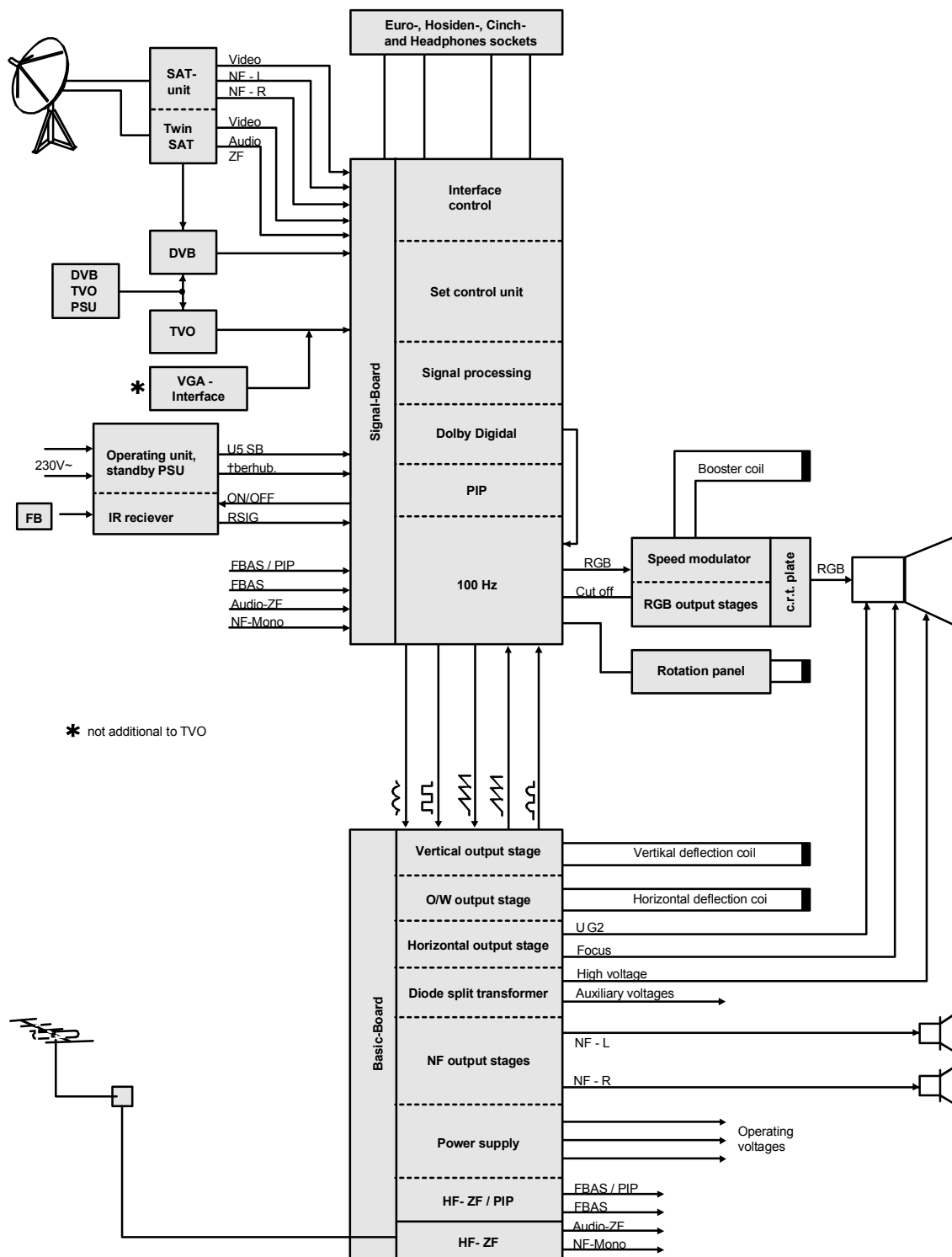
Picture 3



Picture 3*

Display mode 100Hz

No.	Picture change frequency	Video scanning pattern	Deflection scanning pattern	Mode	Advantages
1.	50Hz	A-B	a-b		
2.	100Hz	A-A-B-B	a-a-b-b	DLC off	-Reduction of large area shimmer
3.	100Hz	A-B-A-B	a-b-a-b	-Photo CD on -PAL plus Cinema Scope	-Reduction of large area shimmer -Reduction of interline shimmer in full picture setup
4.	100Hz	A-A'-B'-B	abab	DLC on	-Reduction of large area shimmer -Reduction of interline shimmer in full picture setup with movement
5.	100Hz	A-A*-B*-B	abab	DMI	-Reduction of large area shimmer -Reduction of interline shimmer in full picture setup with movement -Movement interpolation



2 Basic board

This main heading covers the analogue stages from the power supply circuit through the power output stages to beam current limitation, irrespective of whether or not they are contained on the basic board. In order to maintain consistency, several smaller stages on the basic board are also described.

2.1 Standby power supply

The Q 2500 receiver once again contains a standby power supply circuit, thus limiting current consumption in this mode to < 2 Watt.

The use of a new CCU SDA 6000 on the signal board increases the standby power consumption from 1 W to 2 W, compared to the older model. To meet the requirements of increased power consumption, there is now a small, blocking oscillator type power supply attached to the operating control, which supplies the U5 SB.

Siemens Corporation has announced a new index of the SDA 6000, that needs only 1 W power in standby operation. This will be implemented on the signal board, but the standby power supply will not be changed.

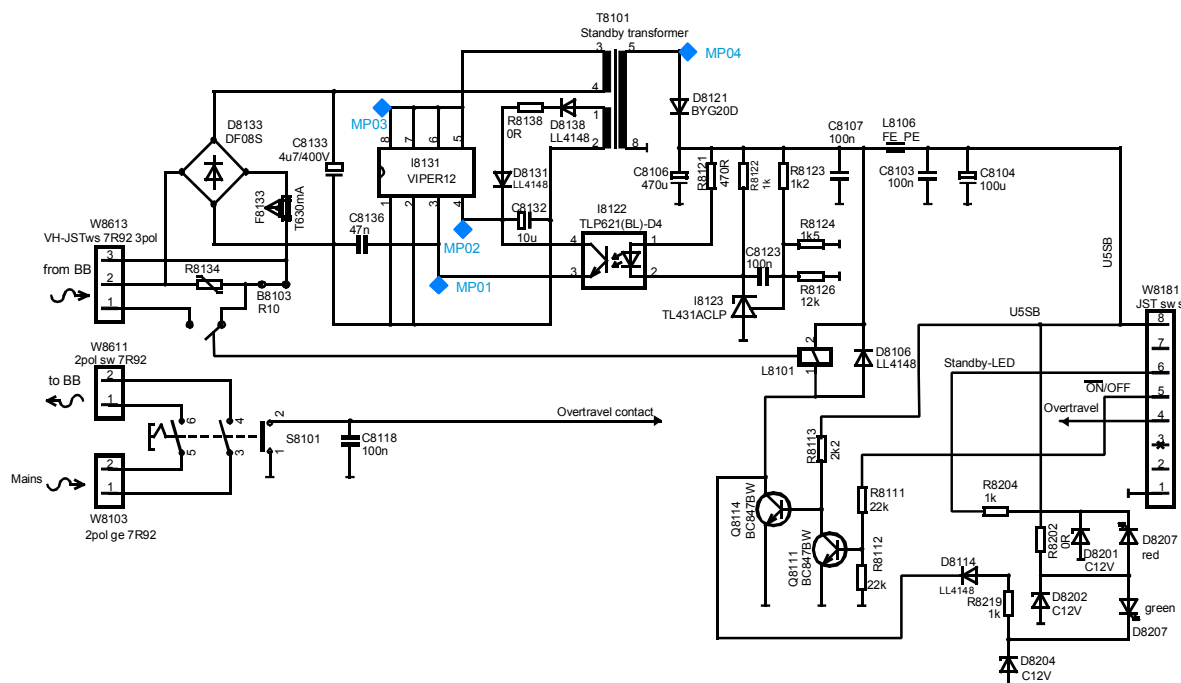
The circuit itself is mounted together with the IR receiver and the LEDs on its printed circuit board. It supplies the U5 SB, which maintains functioning of the IR detector, the processor circuit and the operating software. The last two circuits operate in standby mode, i.e. the clock frequency is reduced internally so that only those stages required to recognize a switch-on command are maintained in operation. Because of the NexTView function with U 3.3 the TV RAM is retained in self refresh

mode. All of this contributes to the standby mode's low power consumption.

2.1.1 Standby power supply circuit

The main voltage is fed via W 8103 the switch S 8101 and W 8611 to the basic board and continues via the line filter (C 612, T612, C 613) and the 3-pole pin connector W613/BB back to pin 2/3 of operating control W 8613. The 220V is rectified by the bridge rectifier D 8133 and smoothed by C 8133. The blocking oscillator type power supply consists essentially of the control circuit I 8131, in which the switching transistor for the primary blocking oscillator winding is integrated, the transformer T 8101 and the opto-coupler I 8122. An operating voltage of about 18V is led from winding T 8101 pin1/2 via D 8138/D 8131 and C 8132 to I 8131 on pin 4. Control input I 8131 pin 3 is supplied with secondary side current control information by opto-coupler I8122. This control circuit stabilises the secondary side output voltage derived from the winding pin 5/8 of T 8101 at 5V. This is then fed via W 8181 pin 8 to the signal board. I8122 is fitted with an internal excess temperature, excess current and excess voltage switch protection. The blocking oscillator type power supply operates at a switching frequency of about 50 kHz.

Q2500 Operating Control



The rectified secondary voltage is applied to pin 2 of the relay winding L 8101. via protective resistor R 106. The cold end is open since Q114 is non-conducting and the receiver is in standby mode. This is indicated by illumination of the red LED.

Transistor Q 8114 is blocked, if the working contact is open, the device is in standby, which is indicated by illumination of the red LED.

If the processor receives an ON command from the infrared detector it sets its appropriate switch output to low level. This is then fed to the base of Q 8111 via pin 5 in plug W 8181 which is blocked. Via R 813, U5 SB makes transistor Q 8114 switch. The cold end of the relay coil is earthed, the working contact is closed and the main voltage flows to the main power supply circuit via pin 1 of W 8613, thereby switching the receiver on.

2.2 Blocking oscillator type power supply

The voltage supply in the Q 2400 chassis is drawn once again from a free-running blocking oscillator type power supply. TDA 4605 is used as the control and regulating circuit. In terms of its function, this IC resembles the well-known TDA 4601.

It has, however, a different type of output stage. The 4605 is designed to control a field effect transistor.

This circuit uses a BUZ 91 MOS-FET as the switching transistor. Since control of field effect transistors requires virtually no current, reducing the need for heat dissipation, it has been possible to eliminate the heat sink in the TDA 4605 control IC and house the circuit in a dual-in-line package.

On the secondary side, BUZ 71 A V-MOS transistors are used to stabilise U3.3, U5 and U12 in order to keep power dissipation to a minimum.

The converter transformer, which also provides the standard VDE power distribution, has a primary working winding and a secondary winding to supply voltage to the IC and to generate a control voltage.

Secondary windings also generate the following voltages:

UB to supply the line output stage

U 25 to supply the line driver stage

U 3.3, U 5 and U 12
predominantly to supply an operating voltage to the digital control

U9 for the interface switching ICs

U8 for the video ICs

UNF+ and UNF-
used to supply a floating voltage to the VF output stages, approx. ± 18 V

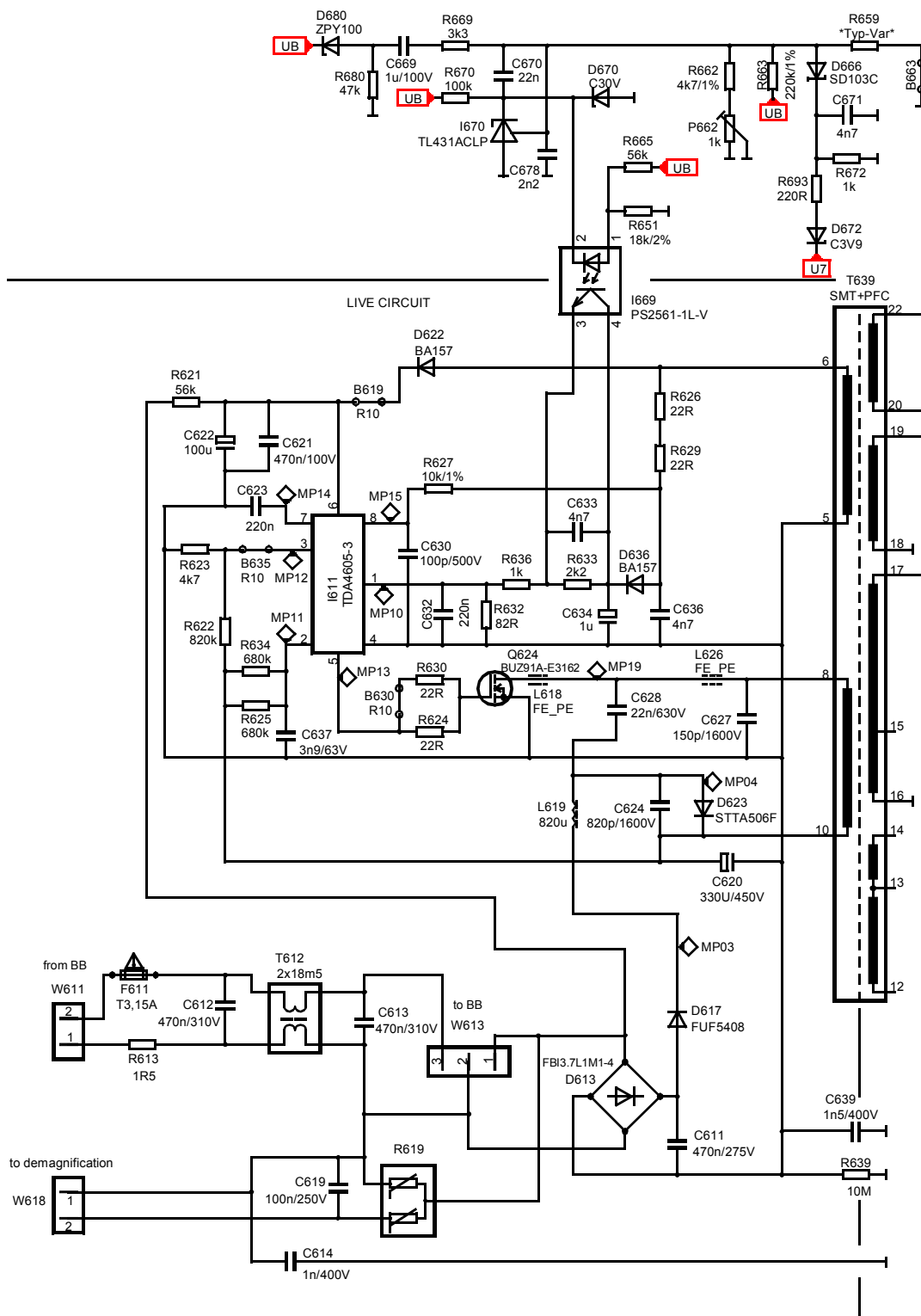
2.2.1 Primary side

The mains voltage flows through the mains power switch, the working contact of the standby relay and the mains RFI suppression filter to the degaussing coil, and via the start-up current limiter R 613 to the bridge rectifier D613.

A voltage of approx. 310 V very rapidly builds up at charging capacitor C 620. This is applied to the drain terminal on the switching transistor via the working winding in the converter transformer.

Since the gate BUZ 91 is not driven at this time, there is no load on the operating voltage.

Q2500 blockingo oscillator type power supply, primary side



2.2.2 Start-up

The power supply section is started up by an additional starting circuit. The required voltage is rectified using a diode path in the bridge rectifier. It is fed via resistor R 621 to pin 6 in TDA4605 where capacitor C 622 is then slowly charged. During this charging phase, capacitor C 637 is charged to 6.6 V on pin 2 via an internal IC path. A reference voltage of 1V that is required during the start-up phase and later during normal operation is also generated in the IC.

If the voltage at pin 6 reaches 12 V the IC operates and makes the switching transistor conducting via pin 5. A current flows through both the transformer working winding and the switching transformer drain source path. During this period, magnetic energy is being stored in the transformer. During this conductive phase, a drain current simulator C 637, integrated in the IC, is charged on pin 2. If the internal reference value of 1 V is reached the IC blocks the switching transistor. The magnetic field in the transformer breaks down and this induces voltages in the windings.

The start-up procedure recommences and the system swings/oscillates to normal operation. This is arrived at when a voltage of 400 mV has built up at pin 1.

2.2.3 Normal and control operation

A static state is set in normal operation at constant load. The operating voltage for the IC is drawn from the transformer winding pin 5-6 and rectified with D622. The voltage at pin 6 in the IC is then 11 V. The control input at pin 1 is 400 mV and the duty cycle for the zero passage detector at pin 8 in the IC is set.

The switching transistor is controlled with a fixed frequency of between 20 and 40 kHz, which corresponds to the instantaneous load.

If the load changes, the duty cycle at pin 8 in the IC also changes. The negative edge indicates to the IC when the energy stored in the transformer has been dissipated. If the load increases, this occurs more quickly and the IC reduces the control frequency. If the load decreases, the control frequency increases. This means that load variations between approx. 40 and 260 W and mains voltage fluctuations between 180 and 270 V can be compensated for.

In order to achieve a higher UB voltage stability, regulation on the secondary side is now used which influences the primary circuit's I 669 opto-coupler. The I 669 opto-coupler is controlled via I 670. The control mechanism is influenced via several paths:

- With d.c. voltage via R 663
- Alternating, by coupling to the R 680 diode.
- When not under load, via D 672

The operating voltage is set with the P662 potentiometer. A small resistance here indicates a high value of UB. Correspondingly, a high value of R means a low value for UB.

If UB increases, e.g. due to a smaller load on the line output stage, UB exerts a stronger influence via R 663 at the input of I 670. This results in the I 670 cathode outputting a smaller voltage. The photodiode in I 669 receives more current through R 665. The path between pin 3/4 of I 669 has a lower resistance allowing for a higher voltage on pin 1 of I 611. Component I 611 then regulates output voltage until a value of 400 mV on pin 1 is reached again. If the value of UB becomes lower, then the regulation process is exactly the inverse of that described here.

Via D 680, R 669 and C 669, ripple voltage components are coupled into the regulating circuit. In particular, this branch prevents a low 50 hz ripple voltage arising on UB. With 60 hz signal sources (NTSC, PAL 60 Hz or VGA operation), this would result in humming interference in the picture.

Without secondary-side regulation, e.g. in SAT standby operation, UB would increase to approx. 180 V. In this mode of operation, other voltages (e.g. the bias voltages for the U 5, U 12 branch) do not alter significantly. Stabilization is also guaranteed for these voltages in this mode of operation.

Due to the secondary-side stabilization with UB as stabilization factor, UB without any load would naturally remain constant. In this case, the power supply would regulate down from approx. 180 V (without secondary-side regulation) to the previously set value of UB, typically 146 V. This would also result in all other voltages being reduced. The bias voltages for the stabilized voltages would be too low and they would no longer be stabilized. The digital electronics would search for errors.

In order to prevent this, the regulation acts via U 7. This is accomplished via components D 672, R 693 and 666.

U 7 also drops when the line-output stage is disconnected. When this has reached a value of approx. 6V, the D 666 Schottky diode voltage has also fallen sufficiently for it becomes conducting. A further drop in operating voltage is prevented by the I 670 input. Stabilization of secondary side voltages, e.g. for U 5 and U 12, still operate properly in this mode of operation.

2.2.4 Protective operation

The IC contains a protective circuit to prevent the control frequency from entering ranges where it would otherwise damage the switching transistor during over- and underload. In such cases the system is shut down.

The indicator for this is the voltage on pin 6 in TDA4605. During normal operation this voltage is approx. 11 V. If the load increases, due to a short circuit on the secondary side, for example, the voltage on pin 6 drops. If it drops below 7V, the logic circuit switches off. The same occurs if the voltage on pin 6 exceeds 15 V due to complete discharge or a fault in the control circuit. There is also a second protective circuit to safeguard against overloading. If the current flowing through the working winding in the transformer and therefore also through the switching transistor is so great that the voltage on pin 3 drops below 1 V, the power supply also cuts out.

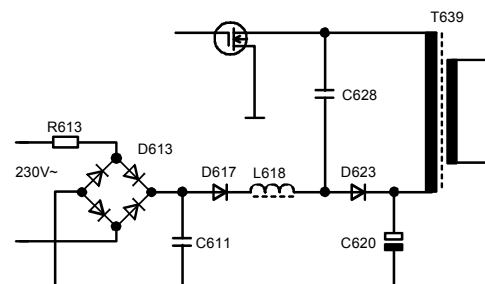
In addition, integrated thermal protection switches the system off at chip temperatures of over 150°.

2.2.5 Power Factor Control

All TV sets with power consumption of more than 75 W, and delivered after 01.01.2001, must be fitted with a Power Factor Control (PFC) circuit.

The circuit power supplies used up to now overlay a pulsed current on the sinusoidal mains alternating voltage. The Power Factor Control circuit ensures current extraction is almost completely sinusoidal. This function is implemented by changing the power supply's input range

Power Factor Control



The alternating voltage from the mains is rectified by the D 613 bridge rectifier. When in resonance, C 620 is loaded to approx. 310 V. Without PFC this means that mains current will only be drawn when the sinusoidal half-wave exceeds 310 V. Sinusoidal current extraction is therefore not guaranteed. With the PFC circuit, C 620 is not directly charged from the mains. Charging of C 620 is via the C 628 current pump. When the Q 624 switching transistor is conducting, C 628 is connected to earth. C 628 is charged via D 617 and L 619. If Q 624 is now switched off, a voltage of approx. 400 V is set on the drain.

The energy stored both in C 628 and in the coil can now charge up C 620 via D 623. C 628 will naturally also be charged when the sinusoidal mains alternating voltage just crosses zero and has a low value.

Q 624 is switched with a frequency between 20 kHz and 40 kHz, depending on load conditions. This also means that C 620 is charged with a current at the same frequency. The current drawn from the mains would also correspond to this frequency, but will be harmonized by the mains input filter.

2.2.6 Secondary side

Although the secondary side voltages are relatively stable, and fast and transient changes in load can be compensated for by the field effect transistor in the primary side, stabilisation of voltages in the digital component is still required.

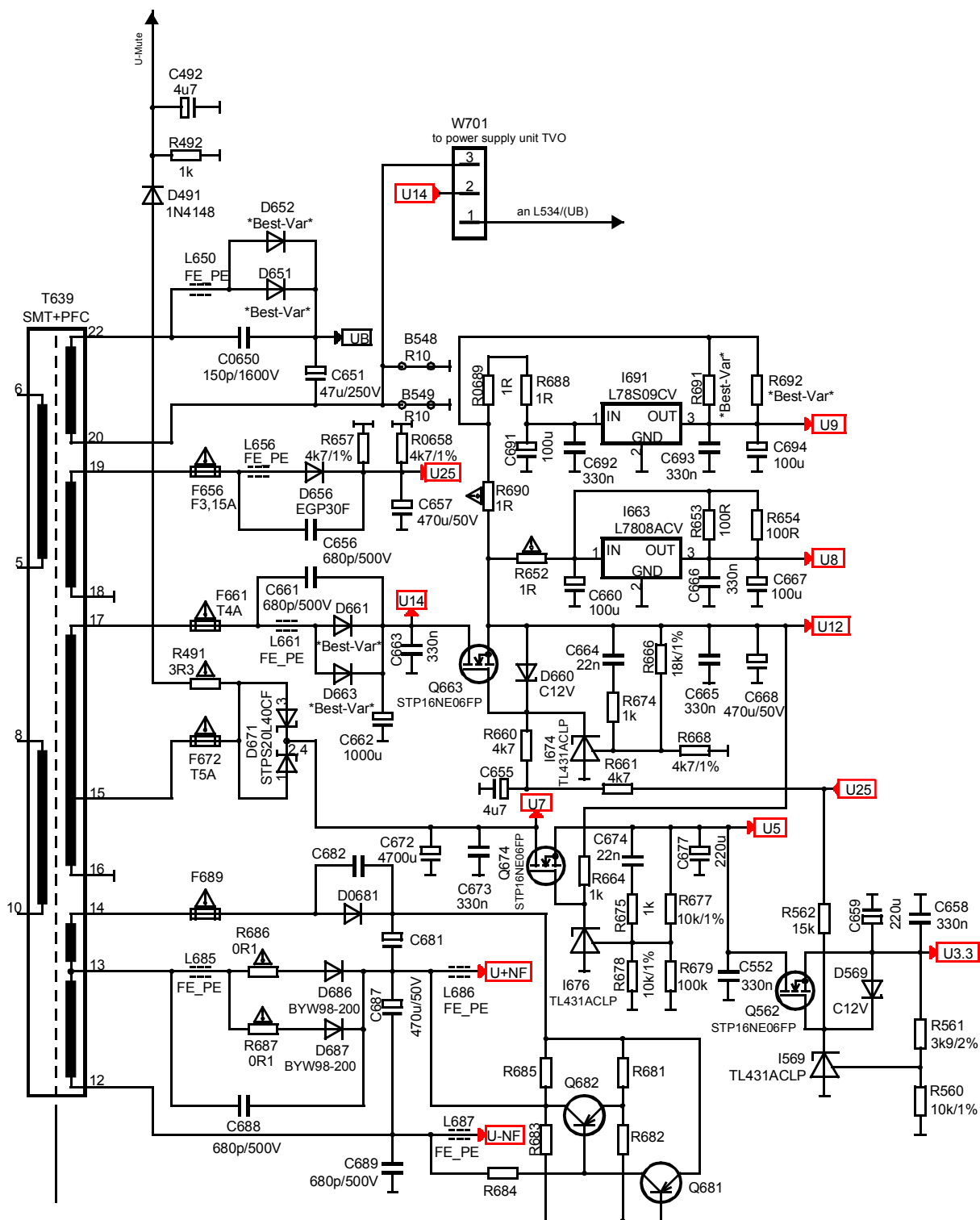
The two secondary voltages U 3.3, U 5, U 8, U 9 and U 12 are stabilised

For the other secondary voltages:

- UB for the horizontal stage
- U 25 for the horizontal driver stage
- UNF+ and UNF- for the VF output stage

Stabilisation is not required, as no current is drawn from these non-controlled levels.

Q2500 blocking oscillator type power supply, secondary side



2.2.7 Voltage stabilisation

For each of the operating voltages U 3.3, U 5 and U 12 a V-MOS transistor is used as a horizontal controller for stabilisation. Their gate voltages are kept constant by the connected IC's I 569 for 3.3 V, I 676 for 5 V and I 674 for 12 V. In addition, their control input is connected to the voltage distributor by the respective output voltage.

If the output voltage falls under high load, the IC's become high resistant causing the gate voltage to increase and the horizontal controllers are controlled upwards further, whereupon the output voltage increases again. If the load decreases the opposite occurs.

In addition, voltages U8 for the video control and U9 for the interface with the fixed voltage controllers L 7808 and L 78S09 are stabilised. The controllers I 663 and I 691 are now also located in the power supply. The input voltage is U 12.

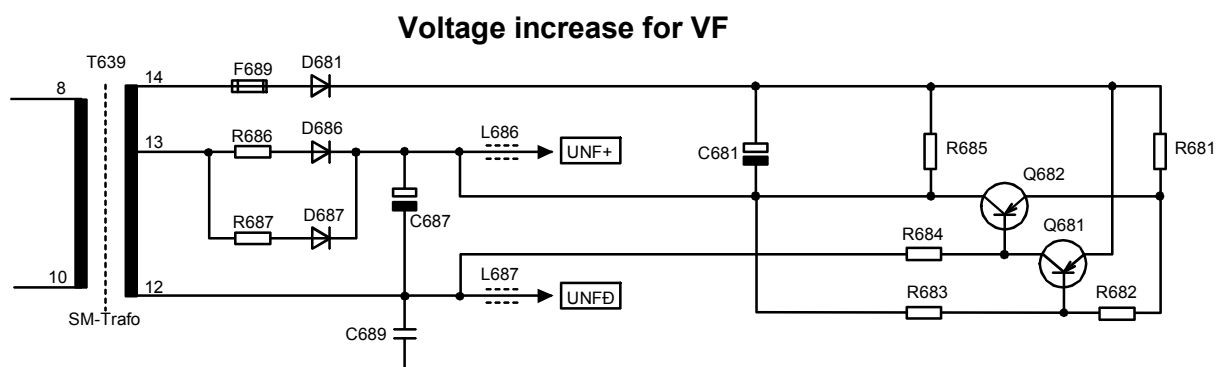
2.2.8 Voltage increase

To avoid overloading the VF output phases, they are supplied with a load-dependent operating voltage. The control range of the circuit for this lies between ± 18 V in no-load operation and ± 13 V at full load.

The pulses taken from pin 14 of the transformer are rectified by D 681 and applied to the emitter connections of transistors Q 682 and Q 681. For no-load or low-load operation no voltage is felt across current measurement resistor R 681. This means that Q 681 is blocked and Q 682 is switched through to its base with L level via R 684. The voltage from pin 14 of the transformer increases the VF operating voltage to +18 V.

If the noise level is increased, more current is drawn accordingly. There is a corresponding voltage drop across R 681, which means the base of Q 681 goes more negative, the transistor switches and as a consequence with base Q 682 going positive, a greater or lesser degree of blocking is achieved. The VF operating voltage is reduced accordingly.

Harmonic distortion is therefore kept low, thus preventing overheating of the output ICs. In this way a noise-level dependent video pumping can be prevented.



2.2.9 Servicing information

For repairs and fault-finding in the power supply unit the following should be noted:

Always connect the unit via an isolation transformer, especially when fault finding the primary side.

The load on C 620 remains active long after the unit has been switched off. Discharge the load if necessary via a low-resistance resistor.

Operation of the power supply unit without the digital unit is possible. For this pin 5 on pin connector W 8181 is connected to earth, but not until a voltage is applied to the standby power supply. For specific failures, this test can also be done with an integrated digital component.

A check of the horizontal output stage cannot be made by withdrawing the deflection plug. For this test L 534 must be unsoldered. An extra load is not required.

A separate test of the power supply unit function without interference from the chassis can be achieved by unsoldering one side of the secondary side rectifier diodes. The rectifier branch for the UB (D 651) and U7 (671) must be available. The UB can then be loaded with a 100 Watt LED.

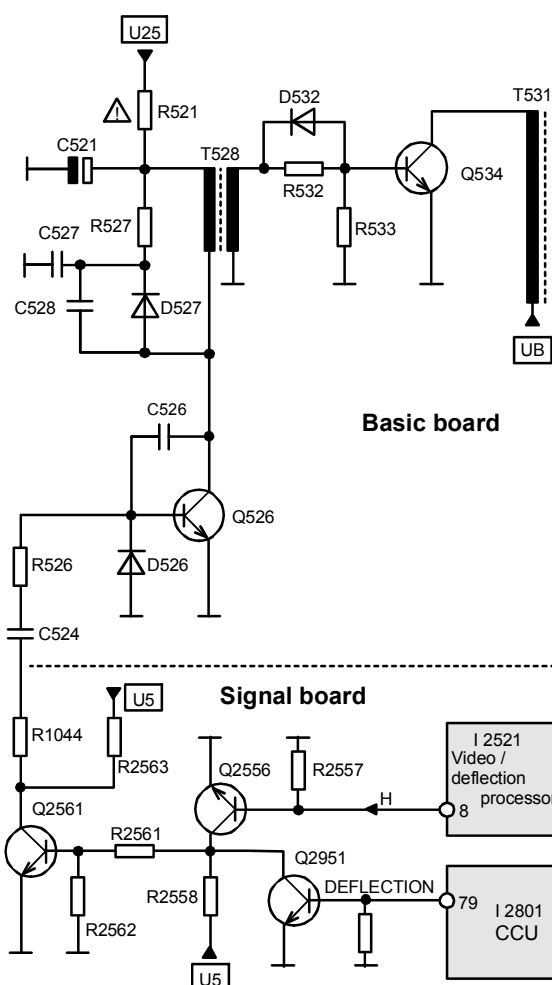
U 7 and UB are necessary for power supply control, so do not deactivate them.

2.3 Horizontal deflection and high voltage production

On the 100 Hz Chassis Q 2500 the horizontal driver, horizontal output stage and high voltage production are essentially the same as the predecessor.

2.3.1 Horizontal driver

The horizontal driver stage is controlled from I 2521 on the signal board via pin 13 from connector W 1511. The pulse at this point is 2.5 Vss.



Capacitive control via C 524 prevents driver stage Q 526 being held conductive continuously if components are faulty or there are no control pulses. Diode D 526 enables rapid discharge of C 524, if Q 526 is controlled in the blocking phase.

It can be clearly determined from the line driver circuit, as from the control of the line output stage, that this is a case of low-resistance current control. The driver stage is equipped with a transistor, which supplies for the drive transformer T 528 (conversion ratio 7:1) output stage the required base control current of up to 0.9 Ass. To limit inductive switching peaks an R/C combination is connected, a.c. to earth, to the collector of Q 526 after diode D 527. The driver stage operates with respect to the output stage in alternating operation, i.e. if Q 526 is conducting, then Q 534 is blocked and vice versa.

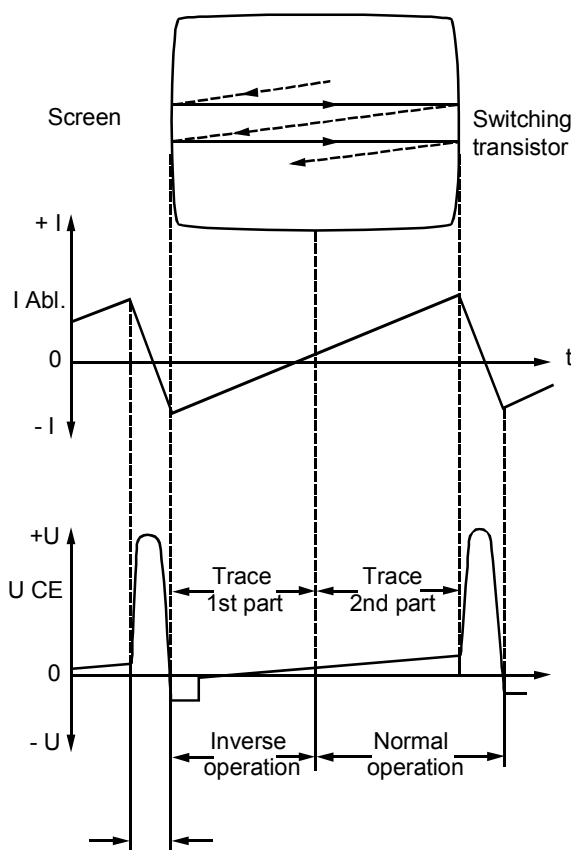
2.4 Horizontal output stage

As mentioned in the previous section control of the horizontal output stage, or more precisely the horizontal switching transistor, alternates according to the switching regulator principle. Essentially the base resistance consists of R 532 and the series secondary winding of the driver transformer T 528. The paral-

lel arranged resistor R 533 dampens switching peaks arising in the inductivity.

An additional anti-parallel diode from collector Q 534 to earth, which was used as a booster diode in earlier forms of thyristor deflection switching, is not required, as in this switching concept the collector-base route of the switching transistor Q 534 fulfils the function of the booster diode by a process of inverse operation. In practice the parallel O/W-modulation diodes cause a perceptible load reduction of the switching transistor. The drawing below shows that this inverse operation of the transistor occurs during the first half of the trace, until about the middle of the line. In the second half of the run the transistor operates as normal with conducting base-emitter diode. Only during the relatively short flyback time is the switching transistor blocked. The low resistance base switching already described enables the base peak current between +0.9 A and -0.9 A in both directions to be dissipated quickly.

It is conceivable that the essentially higher emitter currents ($I_E \text{ max.} = 4.5 \text{ A}$) will invoke enormous "flooding" of charge carriers in the N-P- and P-N-transitions of the semiconductor. In order to guarantee rapid switching behaviour and to ensure rapid discharge of the charge carriers in the base zone, the base control is correspondingly low resistance.



In this respect it must be mentioned that the control pulses are specially formed for the dual functionality of Q 534 normal and inverse operation. In principle the trace relationship of the base control of $6 \mu\text{s}$ flyback and $26 \mu\text{s}$ trace time is changed to $14 \mu\text{s}$ flyback and $18 \mu\text{s}$ trace time. In this way it is possible, to process unavoidable production dispersion of the driver transformer. By means of prompt control the switching transistor has sufficient time to prepare for the following operational phase.

The operating voltage of the horizontal output stage is taken from the switch mode power supply and is 146 V for $33''/4:3$ and

$32''/16:9/\text{RF}$ c.r.t.s, 142V at $21,24,28''/4:3$ and 136 V for all other c.r.t.s. The exact control and switching rhythm during a line period corresponds to the principle of the switched resonant circuit. For this the line switching transistor operates via its three operating conditions - conduction, inverse conduction and blocked - in such a way that the charge and discharge procedures of the collector capacity C 531 and inductivity T 531 determine the exact trace and flyback intervals.

Only during the horizontal flyback time is Q 534 blocked for $6 \mu\text{s}$. By charging the operating voltage the capacitor of the parallel resonance circuit C 531 forms the positive half wave of a sinusoidal oscillation. C 531 and T 531 are dimensioned in such a way that they create horizontal flyback pulses. The natural desire of a parallel resonance circuit to convert the stored charge in the capacitor into inductance as magnetic energy leads to reversal of polarity of the current.

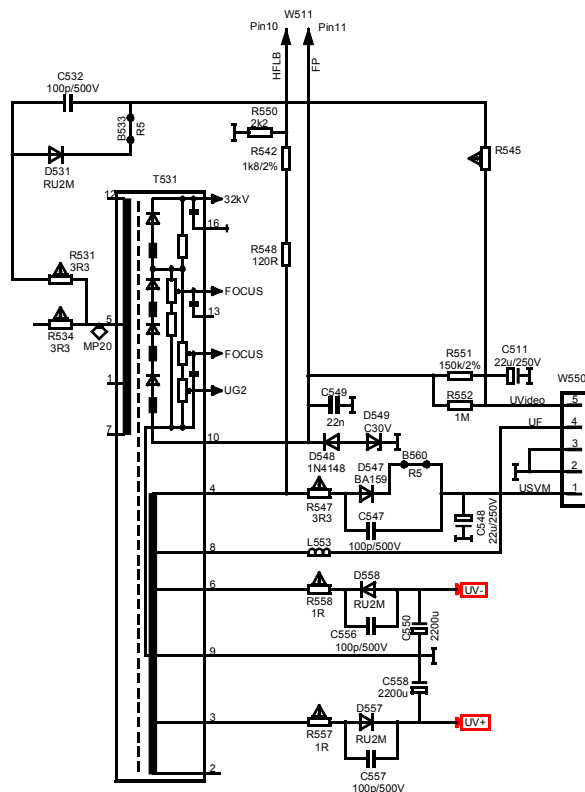
Normally the negative component of the sinusoidal oscillation is felt on the collector of Q 534. This attempt is however prevented by the collector-base diode path of Q 534.

On reaching the start up voltage the diode path becomes conductive and cuts the negative components. In these cases the E/W modulator diodes support this function, whereby in the switching transistor the power dissipation of the transistors is reduced

The horizontal deflection pulses are detached directly from the collector of the switching transistor on the parallel deflection winding. Between the base point of the horizontal deflector and the E/W diode modulator the east/west correction information is coupled in accordance with the dual generator principle. This procedure is almost non-reactive with respect to the primary winding of the high voltage transducer.

2.4.1 High voltage production

Q2500 secondary H output stage



The high voltage transducer also contains the cascade. The secondary winding of the step up transformer is divided into four and the high voltage rectifier diodes are connected between the individual winding sections. This form of high voltage production is possible without the highly charged capacitors used up to now, which increases the reliability of high voltage production and makes possible a space-saving compact solution.

The resistance voltage divider and the potentiometer of the focus and G2 adjustment is integrated mechanically into the splitting combination for units with 4:3 c.r.t.s.

The filament voltage of the c.r.t. is assigned to pin 9. On pin 4 the flyback pulse for the syn-

chronisation of the control is assigned to pin 4. At the same time this pulse is rectified by D547 and fed to the c.r.t. plate via connector W 549. The 60V occurring here is required by the c.r.t. PCB for the speed modulator. The UV+ and UV- for the vertical stage (approx. ± 13 V) occur in the windings between pin 6 and 9 and pin 3 and 9.

Just like the amplitude of the radiation current a corrective voltage for the stabilisation of the horizontal amplitude can be tapped at the base, connection 10 of the high voltage winding.

This radiation current dependent voltage is led to the signal board via pin 11 of connector W 511. The radiation current fuse and limiter are found here.

The operating voltage U_{200} for the video output stage is tapped on the primary side of the pin 5 of the diode split transformer and rectified by D 531. In addition on connection 5 another voltage $U_B - 10\text{ V}$ and on pin 7 a voltage of $U_B + 10\text{ V}$ are produced, which are felt on capacitors C 535 and C 534. On $U_B = 136\text{ V}$ there are 126 V and 146 V. These voltages are required for the offset correction of the horizontal deflector.

2.4.2 Horizontal- offset deflector

The deflector pulse is formed in such a way that through the deflection and S-correction a linear deflection results. This only functions however when the deflection is exactly central. As the Q 2500 chassis could also be used as a VGA monitor, high demands are placed on linearity. For this reason the possibility of offset correction is created.

A free DAC in I 2271 is used for horizontal offset correction. The d.c. voltage felt on pin 55 can be set in the servicing mode. This is fed via connector W 511 /W 1511, pin 8, to the base of transistor Q 533 on the basic board. Q 533 together with R 555 represents a current source for the push-pull stage Q 531 and Q 532. The operating point for the push-pull stage is set with R 537 and the parallel circuit of R 535/538/539. At rest the operating voltage of the line output stage is applied to the base connections of Q 531/532 and both transistors are blocked.

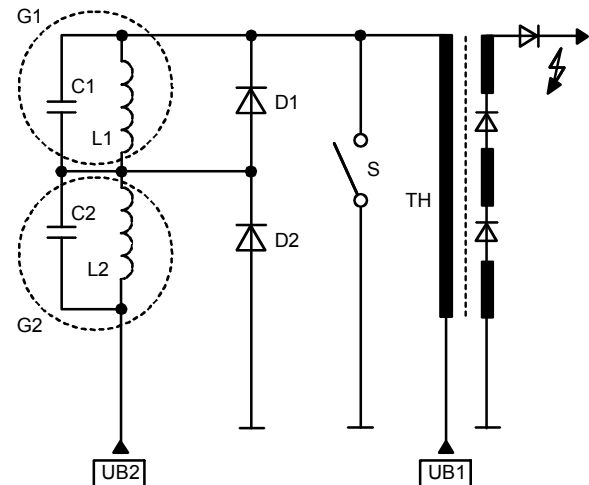
If I 2271 increases the base voltage of transistor Q 533 and this then conducts, the base voltage of the push-pull stage drops and Q 531 conducts. This means the d.c. current is made more negative by resistors R 516, R 517 and R 518 and coil L 530, whereby the deflection shifts to the left.

If, on the other hand, the voltage on pin 27 of I 2271 drops, transistor Q 533 becomes high resistance and the base voltage on the push-pull stage increases. This means Q 532 conducts and L 530 increases the voltage on pin 2 of the deflection coil. This leads to a shifting of the d.c. current component in a positive direction and deflection to the right. Coil L 533 serves as d.c. current coupling for the deflection.

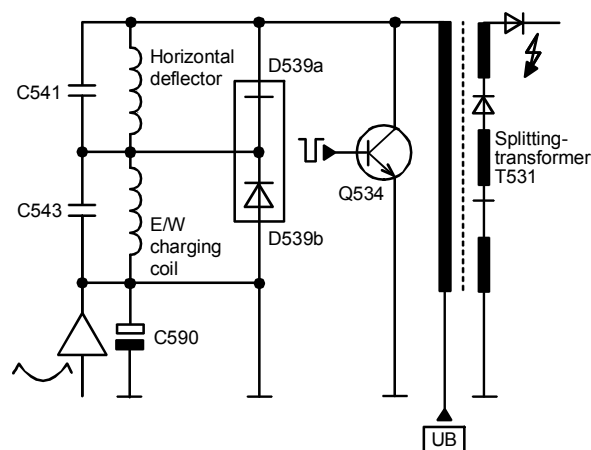
2.5 East/west correction

In order to compensate for the pincushion (distortion) in 110° units in an east/west direction, the horizontal deflection current in the vertical centre must be increased with respect to the vertical start and vertical end. The right degree of correction is achieved by influencing the horizontal deflection current with a vertical frequency parabola in the east/west diode modulator.

Two generators connected to each other by a bridging circuit provide the correction signal for the E/W modulator for the horizontal deflection current.

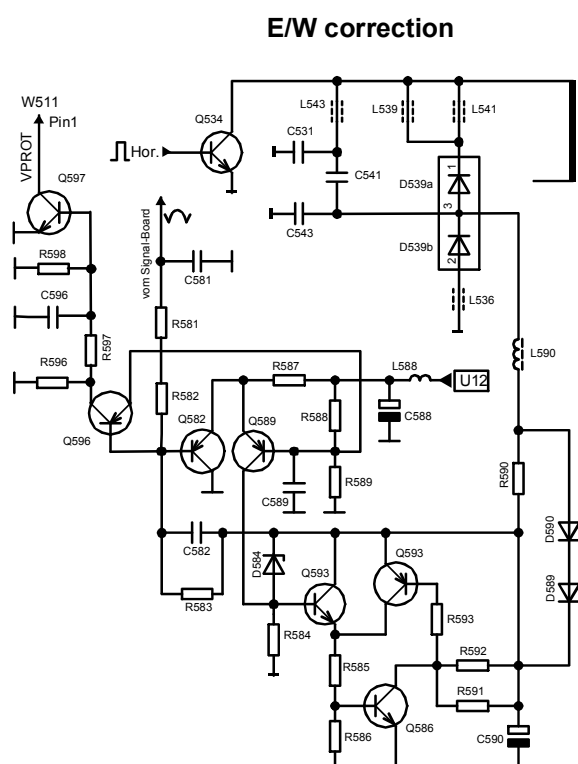


In the above drawing the two generators, G1 = horizontal generator, and G2 = east/west generator, are represented only by their resonant circuits. The deflection current in the deflection coil L1 is supplied by both generators. So that the high voltage is not influenced by the E/W modulator, the voltage on transformer TH is determined only by the horizontal generator G1. Therefore, for correct bridge compensation during the line trace, only E/W modulation of the deflection current takes place in an almost non-reactive fashion on the horizontal output level. For improved clarity the conceptual flow diagram above is shown in the following drawing with the actual component locations.



2.5.1 Circuit

The components of the east/west output stage, as well as the diode modulator are located on the basic board.



The video/deflection processor TDA 9332 applies a d.c. underlying parabola type voltage to pin 3. This Information contains all corrections for picture width and east/west. The following amplifier stage, consisting of transistors Q 582 to Q 589, could therefore be implemented simply as a conventionally based differential amplifier.

Control is via low-pass filter R 581, C 581 and R 582 on the base of transistor Q 582. The low-pass filter suppresses any noise components from the pulse width generator in I 2521.

The base of transistor Q 589 is determined by the voltage divider R 588/R 589 in d.c. and thereby determines the operational point of the differential amplifier.

The amplification of the differential amplifier is determined essentially by the relationship of the negative feedback resistance R 583 and the output resistances R 581/582. The parabola type voltage, amplified to 12 V by output stages Q 585 and Q 586, is fed via the E/W charge coil to the diode modulator. Dual diode D 539 superimposes the deflection current on it and the E/W correction is implemented.

Transistor Q 593 was incorporated to protect the output stage transistor Q 586 in the event of the deflection connector being withdrawn. Normally Q 593 acts as positive feedback to Q 586. If the deflection connector is withdrawn the current increases through Q 586 and therefore also through resistors R 591 /R 592. This causes Q 593 to conduct and the power loss in Q 586 to be returned to a normal level. In the event of a fault the two transistors Q 596 and Q 597 ensure that the unit switches to protective operation. Q 596 is conductively controlled by a reduced base voltage. Q 597 conducts and controls VPROT at low level. The CCU protective circuit responds and switches the unit off.

2.6 Vertical output stage

In comparison with earlier models the Q 2500 generation of chassis does not have an a.c. coupled, but a d.c. coupled vertical output stage. This has the advantage that the vertical deflection coils can be supplied with current directly and the large coupling capacitor can be dispensed with. This means that vertical correction information can operate directly, without vertical distortions caused by the deflection coil coupling capacitor.

As we know, a positive and a negative deflection current flow through the vertical deflection coils. In order for the d.c. coupled output stage to produce this negative current, it must be supplied with a +/- voltage.

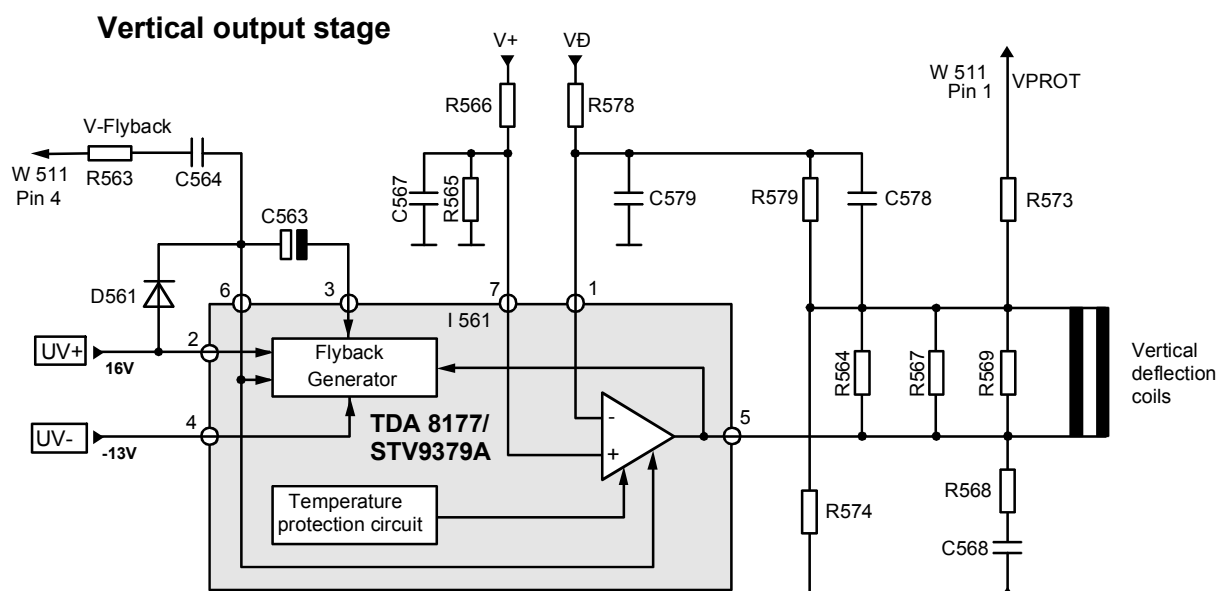
The two possible variants of the vertical output stage IC's (TDA 8177/STV9379FA) incorporated into the 100 Hz Q 2500 chassis

are housed in a Heptawatt plastic housing.

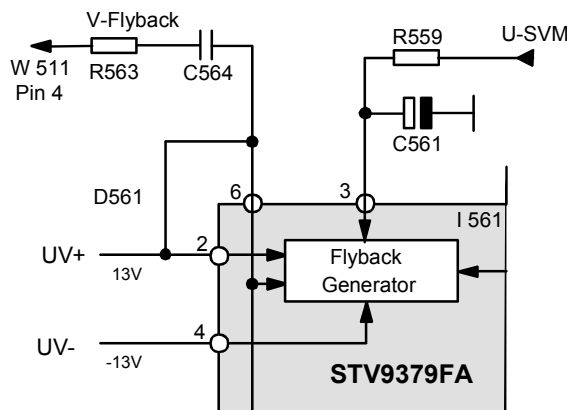
The following functional groups are incorporated into the IC's as circuit components:

- A power operational amplifier that is able to drive the vertical deflection coils with a peak deflection current up to 3 Ass.
- A flyback generator, that generates the voltage charge for the vertical flyback.
- A temperature protection circuit that limits the deflection current on overload.

The power operational amplifier is controlled symmetrically and inversely on its non-inverting and inverting inputs. Therefore, the video/deflection processor outputs two inversely symmetrical vertical control signals.



Vertical output stage



These two control signals contain all vertical correction information. This means that output side S correction, which is necessary for a.c. coupled output stages, can be dispensed with completely. The component insert at the output of the V output stage is also considerably reduced. Symmetrical control almost fully suppresses interference that can affect the two V control signals due to the very high common mode rejection ratio of the V-power operating amplifier. The two V control signals V+/V- are applied to the pin connector W 511, pin 2/3 and reach the series resistors R 566 /R 578 via the inputs on pin 1/7 of the V output stage I 561. The sawtooth, which is amplified about 10 times, is output by pin 5 of I 561 and forces the current through the vertical deflection coils.

The R/C combination 568, from the output of pin 5 to earth, prevents the tendency of the output stage to oscillate and protects it from switching peaks that can be caused by the deflection coils. To stabilise the V output stage, part of the sawtooth from the base of the deflection coils is fed back via resistor R 579 to the inverted input pin 1 .

Picture formation is normally established by the d.c. current component of the deflection current. This means that for a d.c. coupled V output stage, by simply changing the d.c. components of the control sawtooth, the d.c. component of the deflection current can be changed, and with it the picture formation.

2.6.1 Flyback generator

The job of the flyback generator is to provide, the switching voltage for the voltage increase during the vertical flyback. The problem with this is as follows:

The energy requirement of the vertical output stage is at its highest during the flyback, as the electron stream has to be directed rapidly from the lower right corner of the screen to the top left corner.

This transitory additional energy requirement is achieved by doubling the operating voltage, which is only available for the vertical output stage. During the vertical trace, the bootstrap capacitor C 563 is charged to approx. 26 V via D 561. The output of the flyback generator at pin 3 of I 561 at this point is UV-/ -13 V. At the time of flyback start, the flyback generator is switched by the output stage output at pin 5 and applied to the output at pin 3 UV+/ +13 V. Due to the d.c. shift on the minus pin of capacitor C 563, the operating voltage for the output stage on pin 6 increases by the voltage in C 563. At the same time, D 561 is blocked, which prevents the charge in the power supply leaking away. This means that for rapid flyback there is a transitory +40 V (approx.) operating voltage available.

For many c.r.t. types the flyback pulse is not sufficient to fully return the deflection beam, so that flyback lines are visible.

In these devices the V output stage of STV9379FA is used. For the flyback generator this has an independent voltage supply. A USVM/60V is used that is fed to the I 561 via the fused resistor R 559 on pin 3.

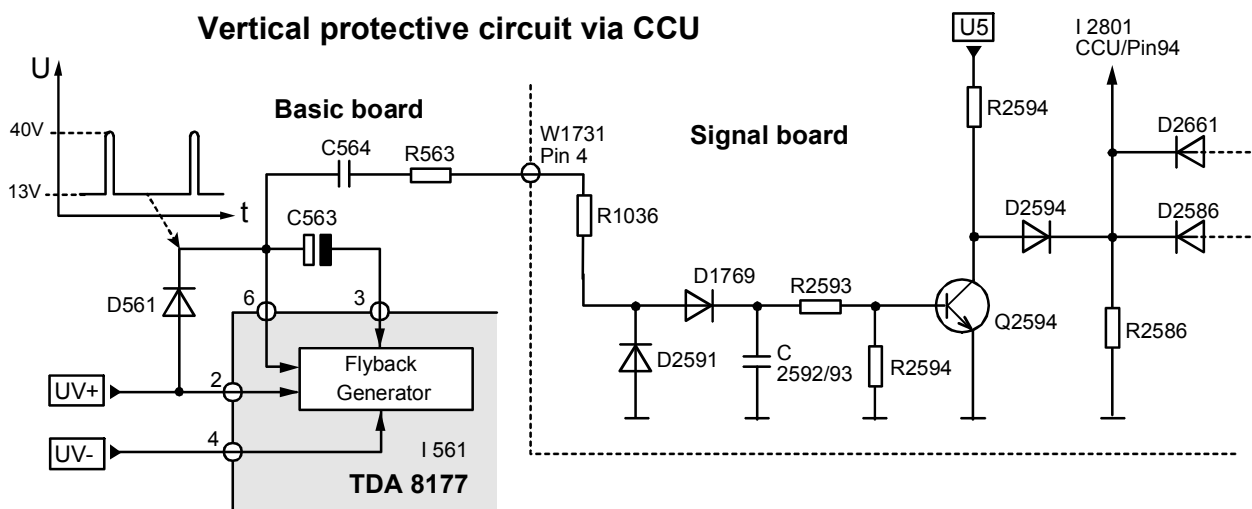
If the V output stage is changed during service then ensure it is replaced with the same type. The two IC variants are not compatible.

For a d.c. coupled V output stage a fault situation can theoretically occur in which the deflection saw tooth appears to be available, but a faulty d.c. component directs the electron beam to the upper or lower end of the c.r.t. neck. This could cause the c.r.t. neck to melt and lead to destruction of the c.r.t. neck.

To prevent this a V saw tooth is taken from the base of the V deflection coils with R 573 and a d.c. voltage is applied to the signal board with R 2651.

2.6.2 Vertical protection circuits

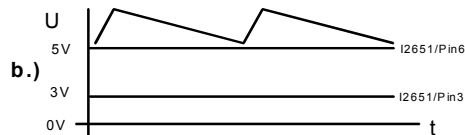
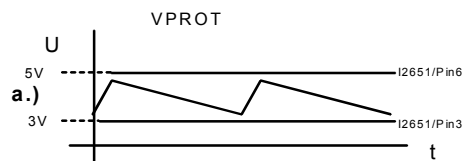
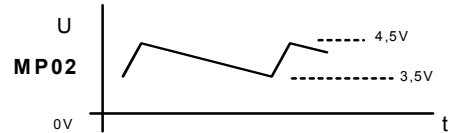
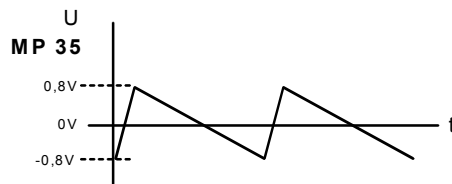
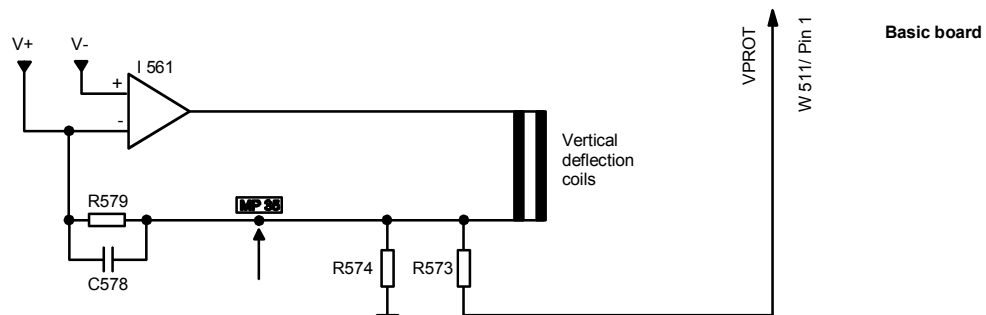
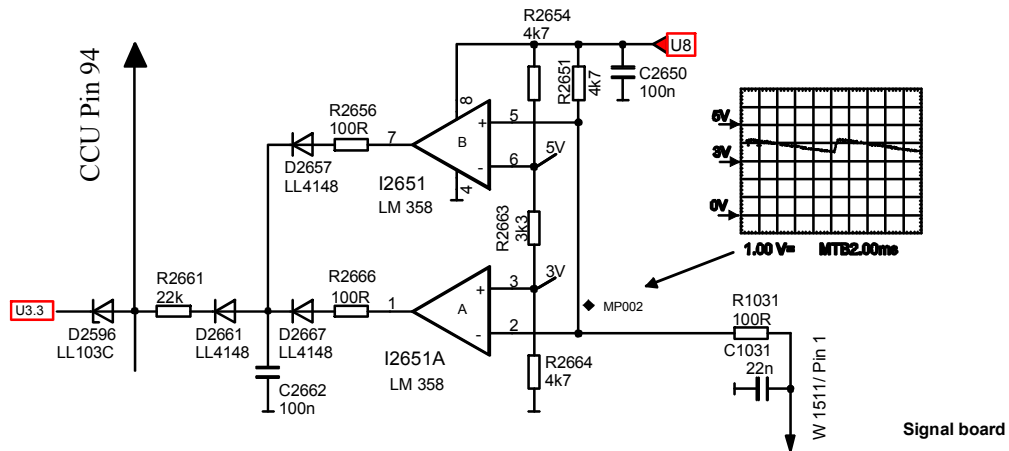
Protection circuits are used to protect the c.r.t. against burning if the vertical deflection fails.



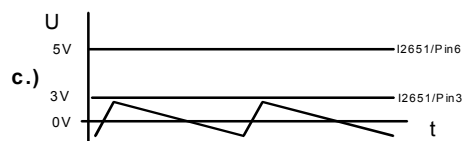
This VPROT signal is fed to the protective circuit that consists of the dual operational amplifier I 2651. Operational amplifier A works on its non-inverting input pin 3, with reference voltage of 3 V and operational amplifier B on its inverting input pin 6 with 5 V. If the VPROT signal - Diagram A - does not fall below or exceed the reference values of 3V and 5 V, then the V deflection and the vertical d.c. component through the deflection coils is correct. If the d.c. component is too positive or

too negative - Diagrams B + C - this is interpreted as a fault. If, for example, the d.c. component of the VPROT signal is too small (<3V Diagram C), OP A controls its output on pin 1 to H level. This is fed, via the two D 2667/2661, to CCU pin 94. H level on pin 94 represents a fault and the CCU switches the device within about 2 secs to standby operation. If the d.c.level is too positive (>5V Diagram B) pin 7 goes from OP B to H level and the CCU switches the device off.

Vertical protective circuit via CCU

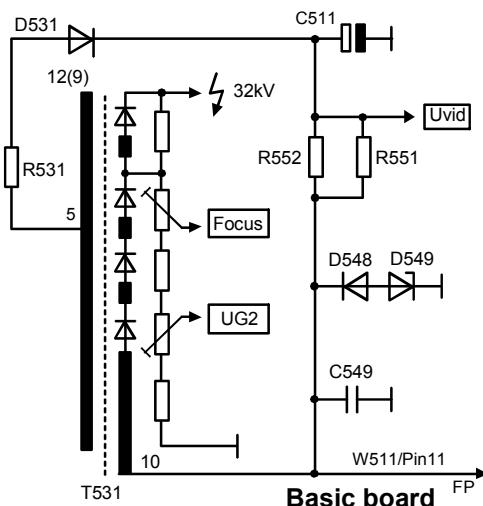


d.c. current component much too positive

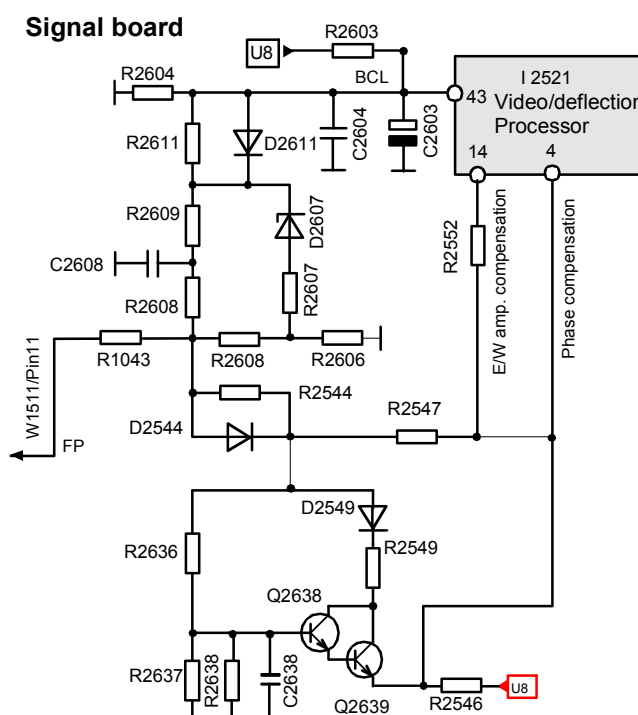


d.c. current component much too negative

Beam current limitation



Signal board



The second protective switch monitors the V flyback pulse that is fed from I 561 /pin 6 via R 563 to the pin connector W 511 /pin 4. On the signal board this V flyback pulse is rectified by diode D 2591/1769 and integrated with capacitor C 2592/2593. With the voltage available on capacitor C 2992/2593, Q 2594 conducts. The collector of Q 2594 is then at the same potential as L, and diode D 2594 is blocked.

If there is no flyback pulse due the absence of a V output stage, no voltage can build up on capacitors C 2592/2594 and Q 2594 blocks. Pin 94 of the CCU is set to H level via diode D 2594.

If pin 94 of C 161 is set to H level by the absence of a V flyback pulse in the operating condition of the unit, as described, after 2 seconds the CCU switches the device back to standby operation. This permits safe shut down of the device with a faulty deflection controller.

2.7 Beam current limitation

To limit the beam current the Q 2500 chassis is provided with an average value control. The limit switch is integrated into TDA 9332.

The switch to limit the contrast and brightness is controlled with a d.c value via pin 43.

The switch is designed in such a way that for a voltage of >3.3 V there is no limitation on contrast and brightness.

For a voltage between 3.3 and 2.2V the contrast is reduced in proportion to the voltage. If the voltage drops below 1.8 V the brightness as well as the contrast is reduced. At approx. 1 V on pin 15 the brightness and the contrast are reduced by 100%, whereupon the screen is black.

To achieve beam current limitation the base of the diode split transformer influences the d.c. value on pin 43 of TDA 9332. Inversely proportional voltage information on the beam current can be obtained at the base.

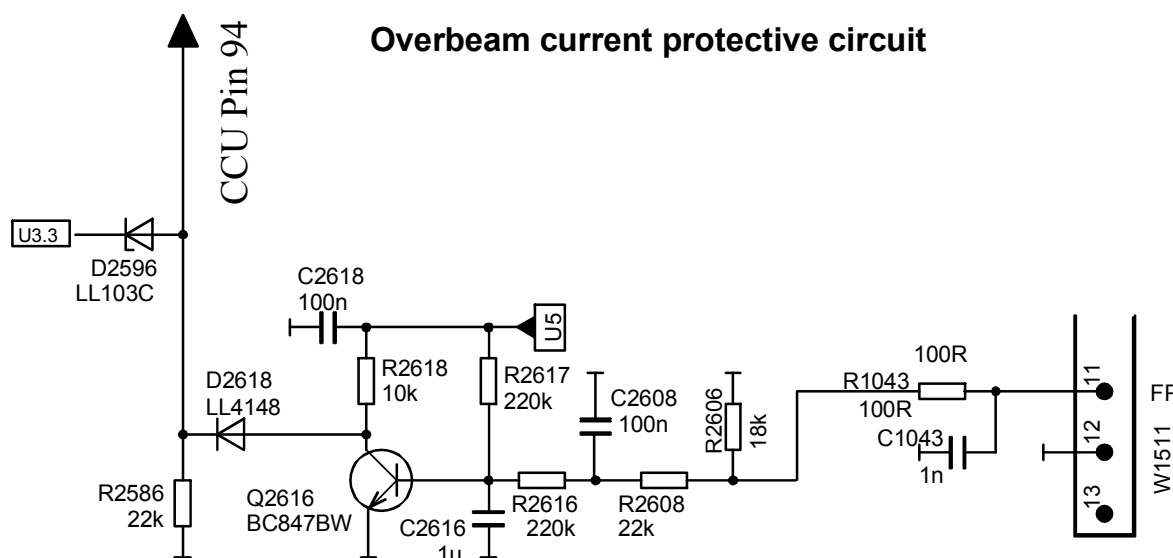
In order for the TDA pin to be at >3.3 V with a beam current of zero, the base of the transformer is connected to U 200 via R 551/552. The positive voltage in this operational state is

charged via resistors R 2608, R 2609 and R 2611 of Elko C 2603 and on pin 43 of the TDA there is a voltage of >3.3 V; there is no beam current limitation.

As the high voltage winding in the diode split transformer operates with a virtual earth, the base becomes negative with increasing beam current, whereby C 2603 via R 2608, R 2609 and R 2611 can be correspondingly discharged to a greater or lesser degree and the beam current controlled.

Diodes D 2607 and D 2611 are provided so that the circuit can also react to jumps in beam current. They ensure the rapid discharge of C 2603.

In addition, for a 4:3 display in a 16:9 TV set, from pin 113 of I 2311 via Q 2612 and R 2601, the voltage on C 2603 drops. This corrects the beam current limitation for the smaller screen area. (see also signal board deflection).



2.7.1 Overbeam current fuse

In correct operation the beam current measurement input on pin 43 of TDA is at a d.c. level of 2 to 4 V. According to the level, the RGB output amplifier in this IC is controlled to

a greater or lesser extent, which ensures that the beam current limitation is implemented.

If the c.r.t. is controlled upwards to the full extent, even though the gain of the amplifier has been fully reduced, which can occur if there is a fault in the RGB output stage or its

power supply, then the c.r.t. could be damaged if no protective measures are taken.

To prevent this, transistor Q 2616 is connected to the beam current data. In normal operation the transistor conducts and L level is applied to its collector thus making the circuit inoperative.

If the described fault occurs, the base of the diode split transformer becomes negative due to the high beam current, Q 2616 blocks and due to the 5 V on its collector diode D 2618 conducts.

Pin 94 of the CCU is set to H level and switches the device to standby.

2.7.2 HFLB protective circuit

If the line output stage is too strongly overloaded by a fault, the protective circuits discussed cannot respond in any way. Excessive overloading of the H output stage causes the line flyback pulse to reduce in amplitude. The HFLB pulse on pin 10 of W 1511 is therefore monitored by a protective circuit. In normal operation this pulse has an amplitude of approx. 35 V. Via the 20 V zener diode D 2581 this pulse makes Q 2581 conductive in rhythm with the line frequency. Capacitor C 2584 is switched to earth cyclically with the line frequency via Q 581 and cannot therefore charge up. This means that L level is felt on C 2584. If a fault in the deflection circuit causes HFLB to fall below 20 V, zener diode D 2581 and Q 2581 block. C 2584 charges to H level. This H level is fed via D 2586 to pin 94 of the CCU, which switches the device back to standby operation.

2.8 Speed modulator

The device is also equipped with a speed modulator. It is located between the RGB outputs of the digital unit and the RGB output stages on the c.r.t. board. It controls the speed of the electron beam in the horizontal direction, which increases picture sharpness and prevents a defocusing effect at high contrast on vertical, very bright areas of the picture.

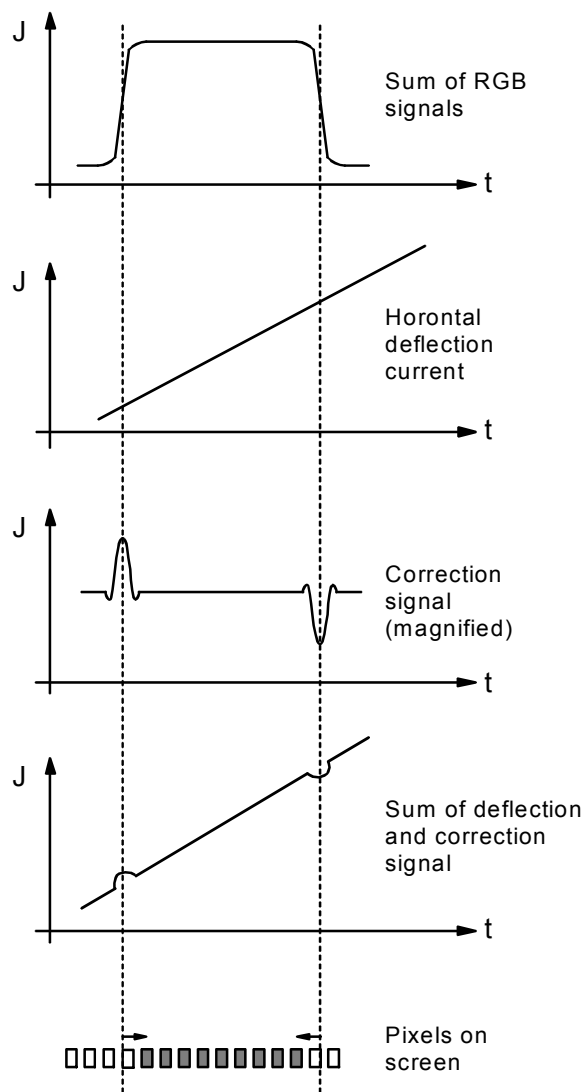
2.8.1 General

The speed modulator evaluates high frequency changes in the picture signal and sends them to an additional winding in the deflector. The resulting magnetic field overlays the normal field produced by the deflection winding. By this method, the deflection speed is adapted to the picture content, which leads to a definite improvement in picture sharpness.

A picture change in a positive or negative direction produces a signal, as shown in the following drawing and thereby supplies the additional winding in the deflector.

The amplitude of the signal and the modulation level of the contrast are therefore dependent on the setting and the slope of the signal change.

One could also modulate the deflection current directly, which would however, be more expensive than the second winding.

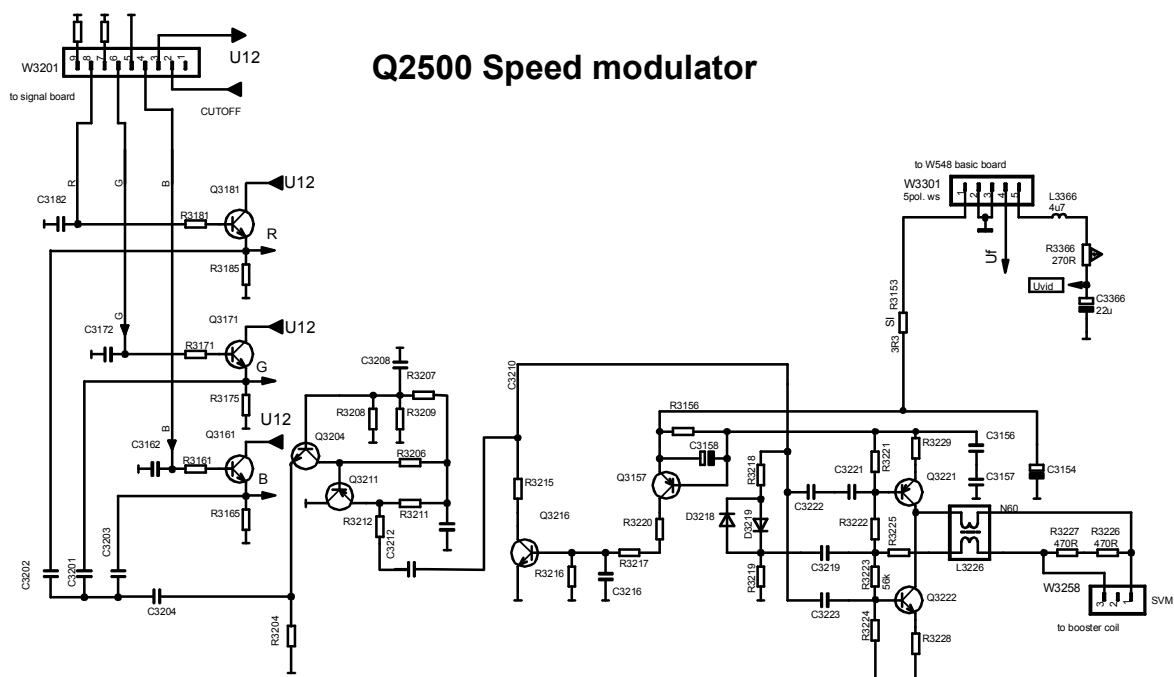


To really understand the operation of the speed modulator we must look at the light characteristics of the pixels on the c.r.t. The longer a pixel is irradiated, the more intensively it shines, and the persistence of the fluorescent image is also longer.

If the signal jumps from dark to light, the deflection is initially accelerated briefly and thereafter remains mainly on one point. In this way the first "bright" pixel is irradiated for longer and therefore shines more brightly. At the same time the last "dark" pixel has more time to fade and is irradiated for a shorter time.

If the signal jumps from light to dark, however, this initially causes braking and then deceleration of the deflection in the speed modulator. This means the last "light" pixel is irradiated longer and therefore shines more brightly. On the other hand, the first "dark" pixel is irradiated for a shorter period.

In both cases another, simultaneous effect occurs. The signal change occurs while the electron beam, without almost any further deflection, remains on the last "bright" pixel.



2.8.2 Switching of the speed modulator

The circuit is located on the c.r.t. PCB and is supplied with RGB signals from TDA 9332 via pins 40/41/42.

The RGB signals are applied to connector W 3201 pins 4, 6, 8 at 3 Vss and are then fed via impedance converters Q 3181, Q 3171 and Q 3161. To detect changes in all three colours, the signals are decoupled by capacitors C 3201, C 3202 and C 3203 together. The resulting signal is differentiated with C 3204, R 3204. Control via the RGB signals offers the advantage that this circuit also works with Teletext and OSD operation.

This means that when steep signal changes occur there are only oscillation packages with max. 0.3 Vss on the emitter of transistor Q 3204 for processing.

The input for the circuit of transistor Q 3204 has a low resistance input, so that it can process steep slopes. From the collector the 4 Vss signals are led to the impedance converter Q 3211. This supplies the signal at 6 Vss to the push-pull output stage Q 3221 and Q 3222.

The two transistors are current counter coupled and amplify the signal to a maximum 50 Vss. All voltage data refers to a black/white change and maximum contrast.

Via the voltage dividers R 3221, R 3222, R 3223 and R 3224 one end of the correction coil on pin 1 of W 3258 is set to 30 V.

The two transistors Q 3221 and Q 3222 are blocked without control, so that the other end of the coil is hanging free and no current flows through the coil. Deflection occurs only via the horizontal deflection coil.

For a positive pulse transistor Q 3221 is blocked and Q 3222 conducts. This causes a current to flow via R 3221 and R 3222 through the booster coil and via Q 3222 to earth, which accelerates the deflection.

If, however, a negative pulse is felt, then Q 3221 conducts and Q 3222 is blocked. The

current now flows via Q 3221 through the coil and then on via R 3223 and R 3224 to earth. The reversed direction of current causes the deflection to be arrested.

The deflection coil is controlled directly from the collector connections. Two resistors are connected in parallel to the deflection winding to stabilise the system and using L 3226 in the control lines a throttling of clock faults is achieved.

To prevent overshooting and overloading of the output stages a protective circuit is provided on the PCB. It affects the level of the input signal.

For very steep positive or negative flanks diodes D 3318 and D 319 conduct via C 3319. Positive flanks at the output reduce the input signal via D 3218, as the signal on the output is rotated by 180° . Negative flanks on the output reduce the input signal, as the input signals are directed to earth via D 3319. The circuit specification is such that it does not operate for small signal flanks, thereby ensuring secure operation of the speed modulator over a wide spectrum.

If there is no picture signal, but only noise, the output stages have become overheated. A protective circuit is therefore provided for this case as well.

If the current in the output stages increases, there is a larger voltage drop across current resistor R 3156. The base of Q 3157 goes negative and the transistor conducts. Elko C 3158 ensures that transient, but high currents for steep flanks are possible. Using transistor Q 3157 in conjunction with transistor Q 3216 the input signals of the output phase are reduced and overloading thereby prevented.

As there is a time difference of approx. 80 ns with respect to the RGB signals in the speed modulator circuit up to modulation of the deflection speed, the RGB signal circuit must be retarded by 80 ns after decoupling from the modulator if it is to function correctly. For this reason the 80 ns time lag lines, consisting, for example, of L 3392/3393, C 3392/3398/399 and R 3391/3393 are incorporated into the RGB lines.

2.9 Colour stages

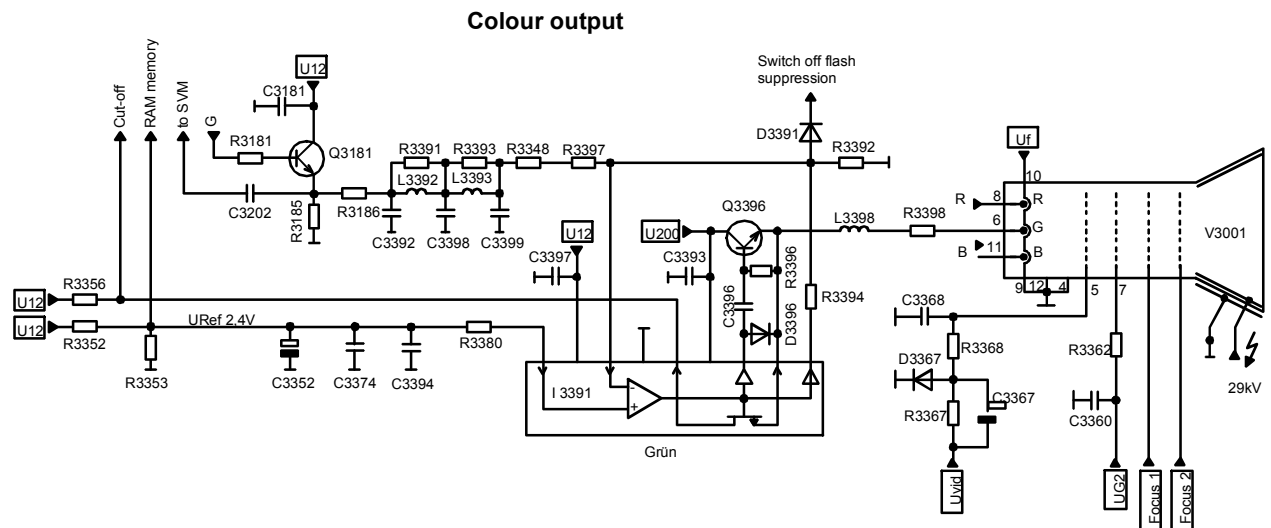
In order to avoid damaging capacitive charges caused by, for example, long cathode wires, which could lead to the frequency response being cut, the RGB output stages have been re-incorporated into the c.r.t. circuit board.

For each colour channel there is an IC whose signal bandwidth of >12 MHz guarantees a high resolution even for rapid signal changes in both directions.

The circuit for the three colour channels is identical. By using ICs the components in the output stages could be reduced to a minimum.

The output stages are energised by the speed modulator with a max. 3 Vss. Via an RC combination the respective signals reach pin 3 of the ICs and are passed on in the IC to the inverting input of an operational amplifier. The non-inverting input and thereby the work point is set via pin 1 of IC.

The resistance between pin 9 and pin 3 provides the negative feedback for determination of the amplification factor.



For control of the c.r.t. cathodes the signals are applied at a maximum 160 Vss via pin 7 and 8. Control is via pin 8 with a corrective signal on pin 7, in order to achieve an automatic blanking current control. The emitter follower on the output of the output stage permits rapid blocking of the cathodes on transition from bright to blank. This permits the delaying effects that are otherwise present to be reduced.

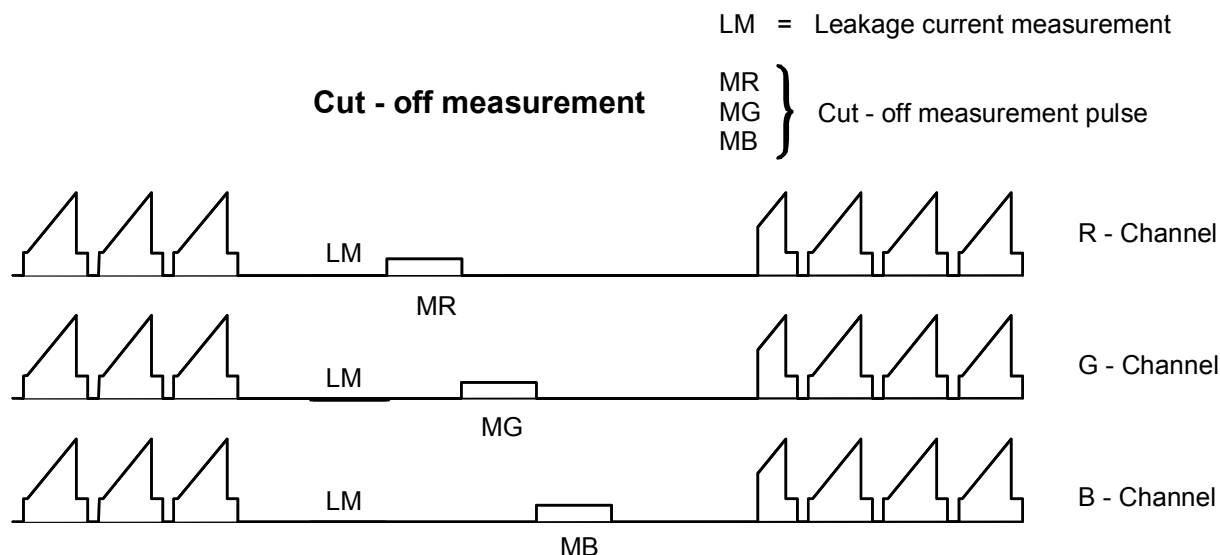
The IC's also contain a component for temperature drift compensation, as well as a circuit via which the transient current can be decoupled. Current information is taken from pin 5, and so with an additional sensor control circuit an automatic blanking value control (cut off control) can be established.

2.9.1 Cut off control

The cut off control is basically a sensor control circuit. It controls electronically dynamic component tolerances and signs of wear, e.g. of the c.r.t.s.

It also has the following advantages:

- automatic blanking value equalisation.
- Avoidance of colour distortion during c.r.t. warm up time and control of above average ageing in the initial operating hours.



This means that the traditional adjustment controller and the associated adjustment work is no longer required.

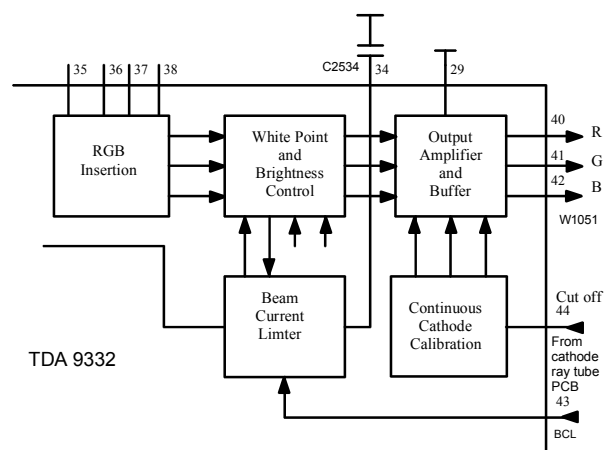
Directly after the vertical picture return, measurements are taken of the leakage current of the c.r.t. systems at ultra blank and then, one after the other, the cathode currents of the three systems after input of a specific blank value.

These pulses are fed with the respective RGB signals via the output stages of the c.r.t. systems. From the output stage IC's the respective blank currents of the control circuit in video IC 1 2521 on the signal board are supplied via its pin 44.

From a comparison between the established blank current and a reference value, which represents the specified current, a difference is obtained, which controls the cathode current via the video output stages as a controller output. It is dynamically stabilised just above c.r.t. blocking current, up to control tolerances. As small leakage currents in the output stages of the c.r.t.s could lead to distortion of the cut

off control, measurement of the leakage current is carried out during the vertical flyback before measurement of the three blanking currents.

Cut - off circuit principle



A consequence of a change to the UG2-voltage is that the cut off control opposes this change. Only a transient effect can be detected on the screen, as long as the control

range of the cut off control is not exceeded. This means an optical comparison of the raster 2 voltage is ruled out. A comparison using a voltmeter is also very unreliable, as the voltage source with approx. 500 MOhm is very resistive.

A comparison of the raster 2 voltage is therefore made in service mode.

2.9.2 Switch off flash suppression

Transistors Q 3341 and 3343 are responsible for suppressing fluorescent flashes on switch off, caused by c.r.t. charges that are not discharged quickly enough via the bleeder in the DST. On start up and during operation they have no function, as the base and emitter of Q 3341 are at the same level it is therefore blocked, as is Q 3343.

On shut down the base of Q 3341 via R 3341 very quickly becomes zero volts. Due to Diode D 3342, that is blocked in the direction of the power supply, Elko C 3342 cannot discharge. Q 3341 switches through and that in C 3342 can switch through via the emitter-collector the output side connected transistor Q 3343. In this way the RGB signals that control the output stage IC's are directed to earth. Fluorescent image persistence is thus avoided.

Until Elko C 3342 is discharged and the circuit becomes ineffective, the c.r.t. discharges via the bleeder.

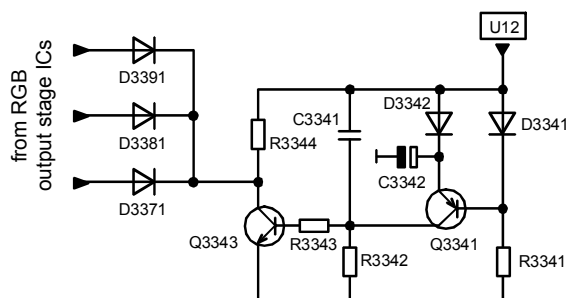
2.10 Rotation panel

2.10.1 Raster correction

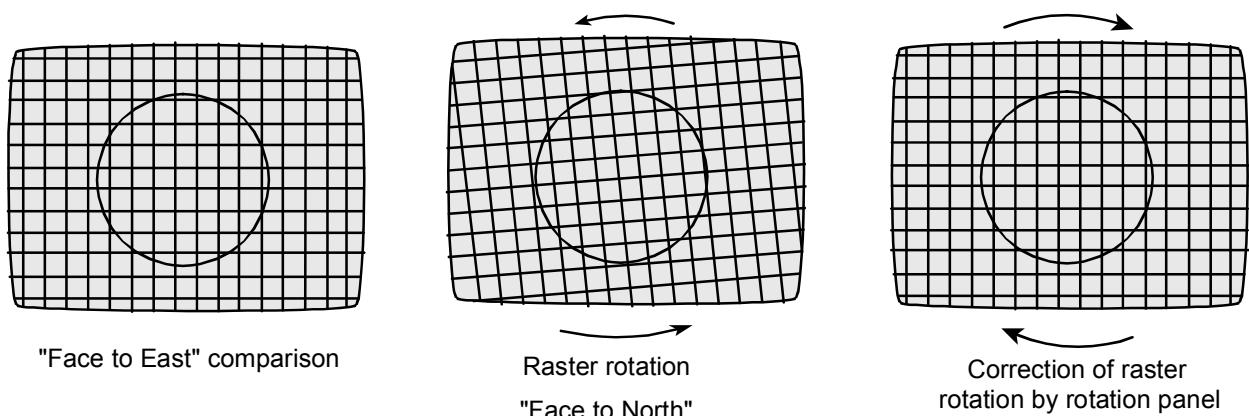
So as the earth's magnetic field affects the colour uniformity of the c.r.t.s, it also influences the picture raster. For a geometrical comparison, a definite alignment towards east ("face to east") is therefore prescribed.

If the device is turned towards another point of the compass, rotation of the picture on the screen occurs according to the type and size of c.r.t. and local characteristics.

Switch off flash suppression



Raster correction

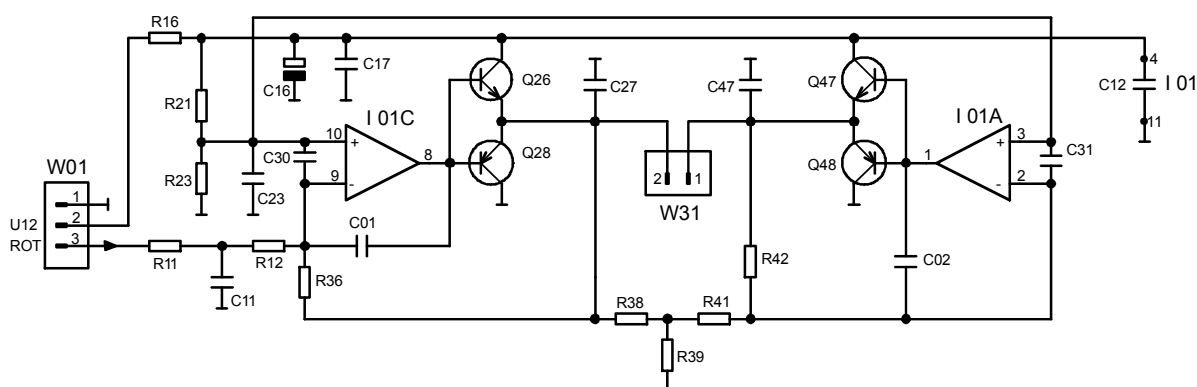


To compensate for this a rotation panel (raster correction) is incorporated into the 81 cm device with chassis Q 2500. As the effect on the raster is less on smaller and 4:3 tubes the rotation panel is not required.

For the raster correction a circular coil is attached to the cone of the c.r.t. If a uniform current flows through it, the electron beam rotates around its own axis. As the created magnetic field overlays the field of the deflection coils, the picture can be rotated about its central point.

2.10.2 Circuit

For raster correction the DAC on pin 25 of the video/deflection processor TDA 9332 is used. The voltage produced can be adjusted by the user via "rotate picture" and in service mode. It flows via W 1021, pin 3 to the rotation panel W 1, pin 3.



In this way the inverting input of the operational amplifier on pin 9 of I1C is controlled on the rotation panel. At maximum anticlockwise rotation approximately 3.2 V is applied and at maximum clockwise rotation 3.3 V. The operational point is adjusted on pin 10 by R21 and R23. According to the voltage difference between pin 10 and pin 9 the push-pull stage Q26 and Q28 is controlled. On the base connections there is a voltage of 0.6 to 10.6 V. The output voltage of the push-pull stage is applied to pin 2 of the correction coil and at the same time is fed to the inverting input of operational amplifier I1A via R 38 and R41. This also controls the second push-pull stage Q 48/Q 47. The two OPVs and push-pull stages counteract each other. This means that a current can flow to earth via Q 26, through the correction coil (from pin 2 to pin 1 on W31) and via Q48. On pin 8 of the OPV there is a voltage of 10.6V at maximum clockwise rotation and on the other output pin 1, 0.6 V. Oth-

erwise the current flows via Q 47 through the correction coil (in this case from pin 1 to pin 2 on W 31) and via Q28 to earth.

In this way the current can be adapted to the required correction with respect to direction and size. This correction can, however, also act in reverse, if the coil is rotated on the deflector.

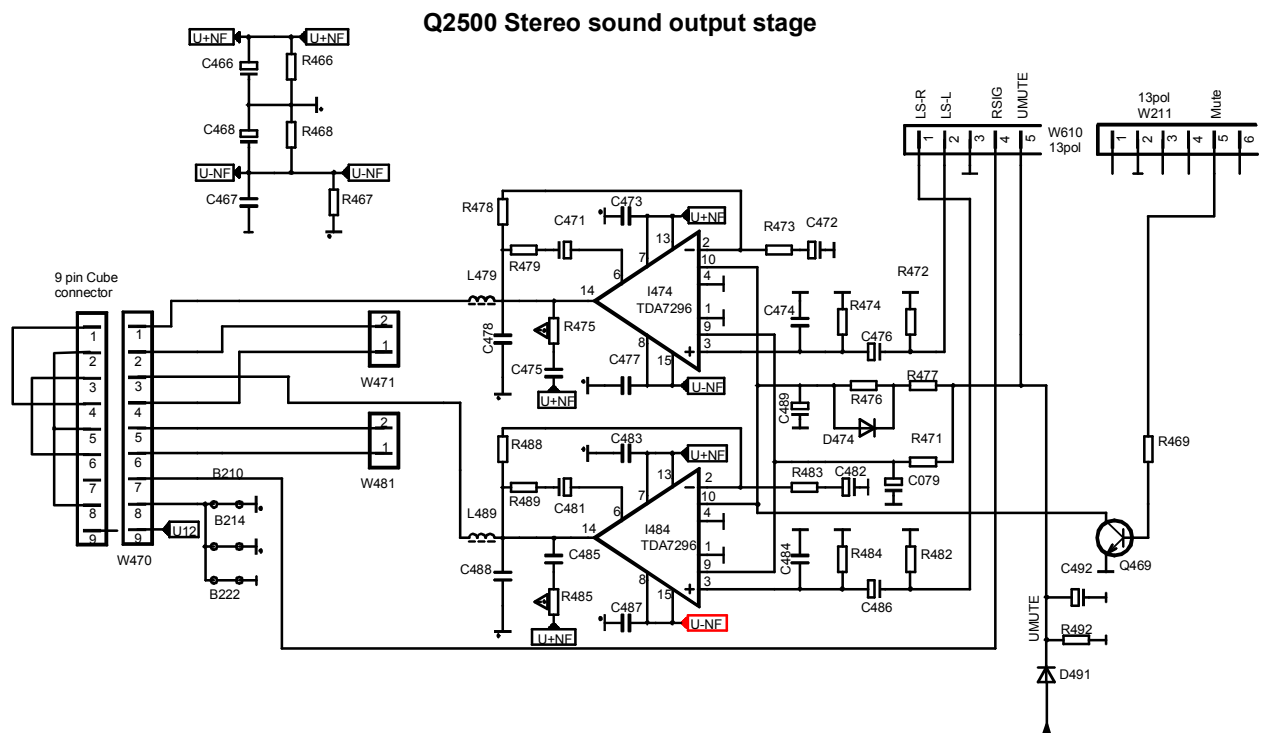
The control electronics for the rotation coil is fixed firmly to the Q 2500 chassis. However, the rotation coil and control electronics should be considered as a unit. In the event of a fault the coil is then changed as a complete unit.

2.11 NF output stages

The two amplitude controlled VF signals are output from pins 56 and 57 of MSP 3411 on the signal board. The signals are applied to the base of transistors Q2081/2083. The transistors are switched as impedance converters

to prevent, as far as possible, the coupling of interference pulses on the VF wires between MSP and the output ICs.

The VF signals reach the two output stages via the coupling capacitors C 2082/476. In between are the two mute transistors Q 1586/88. (See signal board).



The output stages are implemented easily as all control processors (volume, tone, balance) as well as base width switching are processed in the MSP.

Compared to previous models the Q 2500 has new output stages. TDA 7296 is equipped with an internal mute function that removes any residual on and off switching interference that is not fully suppressed by the additional mute switching.

The internal mute switching is controlled on pins 9/10. If the voltage on the pins is <3 V, then the output stages is muted. These two pins are controlled via R/C combinations via UMUTE. On start-up the two capacitors C 479/C 489 are charged slowly via the load resistors R 471/R 476 and R 477. The mute function in the IC is achieved via a voltage differential on pin 9 and pin 10. As long as pin 9 is more positive than pin 10, then the output of IC internal is muted. This is achieved on start-up/ shutdown by the R/C combination with various time constants.

On start-up C 479/22 μF is very quickly charged up by R 471/22 k. For C 489/22 μF charging occurs more slowly via R 477/10 k and R 4476/33 k. This means that in the charging phase pin 9 is more positive with respect to pin 10. On shut down C 489 discharges rapidly via D 474 (which releases R 476) and R 477. Pin 9 is again more positive with respect to pin 10 and mute is implemented again internally.

TDA 7296 can be considered to be an operational amplifier. It is controlled by its non-inverting input pin 3. The amplification is calculated from the negative feedback combination R 478/473.

This results in

$$V = 1 + \frac{R_{478}}{R_{473}} = 1 + \frac{22 \text{ k}}{0.68 \text{ k}} = 33$$

The amplified signal is felt on pin 14 and for the left channel is fed to the loudspeakers via L 479.

The R 479/C 471 combination is necessary for an internal bootstrap. In addition, the output phase is equipped with an overload and temperature protection circuit.

The two output stages are supplied with voltage symmetrically. It is taken from the transformer at zero potential and rectified and smoothed by D 686/687 and C 687. With the help of the R/C combination 466 and 468 it is split into $\pm 18 \text{ V}$ (see also power supply).

This measure achieves a halving of the peak current by the rectifier diodes D 686/687 and a higher undistorted output performance, especially for low frequencies.

An output stage without any electrolytic capacitors contributes to this.

3 Receiver components

3.1 HF/IF unit

Four receive components can be used in devices with Q 2500 chassis. One is the terrestrial tuner, or HF/IF component, which processes frequencies from 47 MHz to 860 MHz. This hyperband tuner is located on the basic board.

Second is the single SAT or dual SAT receiver for the first IF from 950 MHz to 2150 MHz. This is partly a standard feature or can be retrofitted for certain sets.

In addition, for full IP sets a PIP-HF/IF unit for the reception of terrestrial signals is incorporated into the hyperband range. In this case, however, the audio band is dispensed with, as picture for picture only video signals are required. This is also built into the basic board.

With this equipment the set is able to process all television signals, irrespective of whether they are received by terrestrial antennae or via cable units, and even when derived from parabolic antennae.

3.1.1 HF/IF components

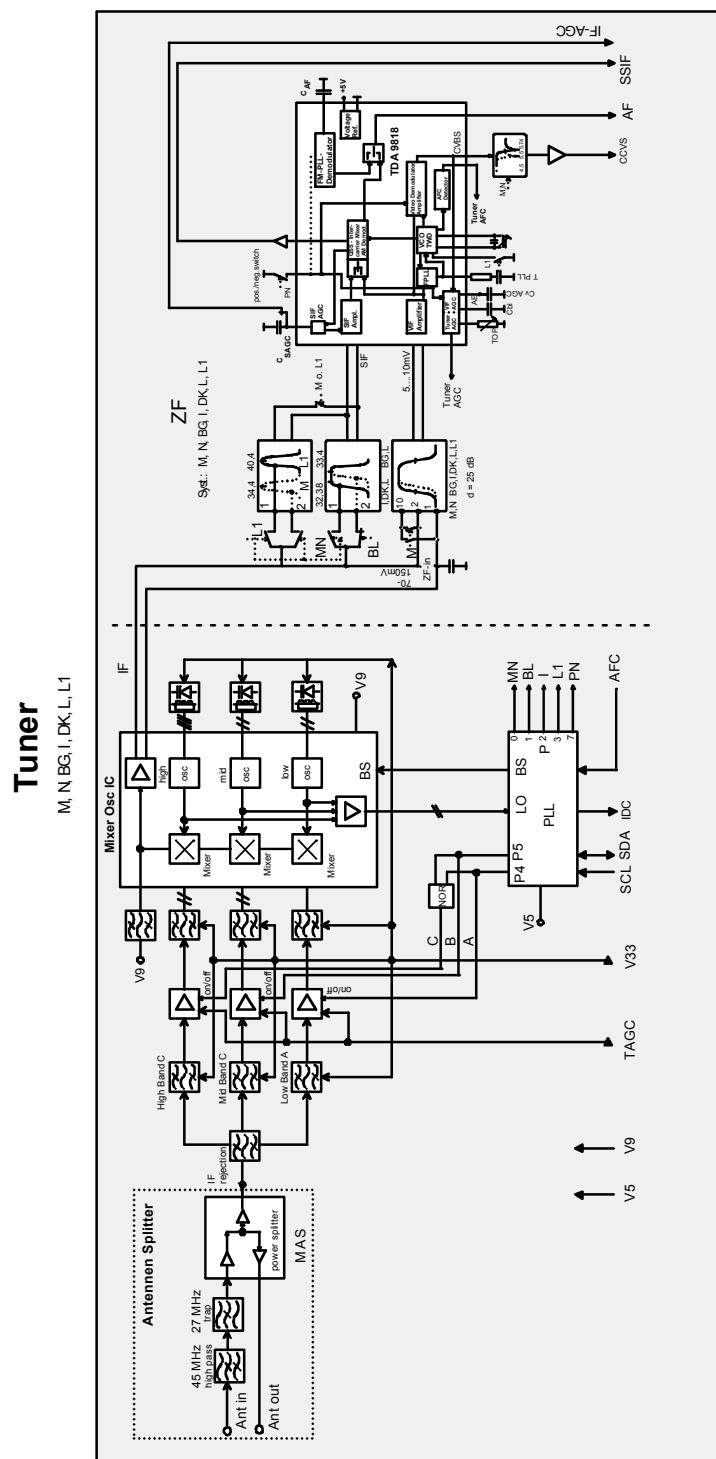
A HF/IF combination is also used. All functions for current European television standards are located in one housing, with two provisos. The IF consists of only one picture IF. The audio demodulation takes place in the audio IC on the signal board. From the IF component only the sound IF is supplied as broadband.

This means that the ceramic transducer and an expensive sound/IF switch are not required. Secondly, for lower price models not destined for export HF-IF, designed only for PAL and SECAM BG, is used. In this case, the change-over to SECAM L and NTSC and the components necessary for this are not required.

This means the two designs are hardware and software compatible.

The following block circuit diagram shows the multi-standard design. Some of the components are not fitted to the BG version.

As in earlier models, the electronics is housed in an HF proof folding housing.

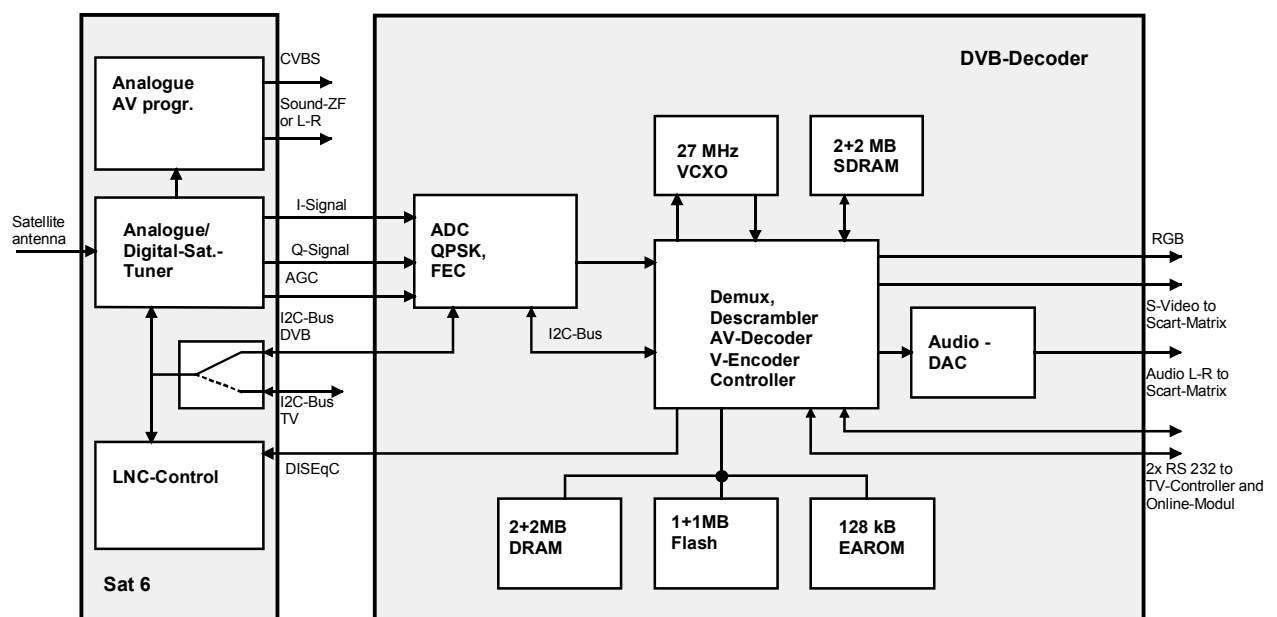


3.2 DVB Board

3.2.1 Overview

The DVB decoder is able to convert DVB signals that are transmitted free to air via satellite into the appropriate analogue audio and video signals, which are then fed to the signal processing of the TV chassis.

For the conversion of the L band signal derived from LNC or a multiswitch, the combi-tuner of the satellite unit Sat 6 is designed as an assembly set or retrofit set for the Q 2500 chassis. It also supports the interface to an integrated online module.



The following block diagram shows the principal architecture of the Sat 6 and DVB decoder. The interface between Sat 6 and the DVB decoder is formed from quasi-analogue I and Q signals, the AGC signal, the IIC bus and a port used for DISEqC. The IQ signals are derived in the satellite tuner by quadrature mixing of the second IF (479.5 MHz) in the base band. The AGC signal provides amplitude control of the IQ outputs of the tuner. As the Sat 6 unit is able to process analogue and digital signals, both the DVB controller and the TV controller have access to the tuner and the LNC supply. The switching of the IIC buses used for this is achieved by the TV controller driven by the Sat 6 unit.

The processing of DVB signals from the tuner base band interface to the analogue output is achieved by two high integration chips. The first is the front-end component STV0299B (ST microelectronics) that digitises the IQ signals coming from the tuner by means of dual ADCs, demodulates them (carrier and pulse extraction) and carries out Forward Error Correction. The second component is the MPEG-2 demultiplexer-, decoder-, backend- and controller chip STi5500 (ST Microelectronics), which demultiplexes the MPEG-2 transport beam, feeds the selected audio and video components to the MPEG-2 decoder for decompression, decodes them and then converts them into analogue output signals. The STi5500 also has an integrated 32-bit RISC

controller that forms the core of an independent processor subsystem. It is responsible for the control and diagnosis of the other functional units of the DVB decoder module. Commands and data are exchanged via a serial interface to the TV controller. In addition, the DVB is responsible for applications such as the Electronic Program Guide for DVB programmes. In this case the on screen display from the OSD component of the MPEG-2 video decoder is produced. For communication between the TV controller and the controller of the online modules, the data is transferred transparently between the two serial interfaces.

3.3.1 DVB internal features

3.3 Features and parameters

Feature	Standard/value range	Notes
General		
Receiving and decoding of DVB compatible free to air signals via satellite		
Implementation as integrated module for incorporation or retrofitting in Q 2500	Q2500 basic, medium, high end	
Operational control integrated into the Personal Control System		
Electronic Programme Guide based on standard DVB-SI		
Pre-programming	ASTRA 19.2° East and Eutelsat 13° East	
MPEG-2 main <u>Profile@Main</u> level	720x576 Pixel, 25 Hz	
Support for 4:3 and 16:9 source format (letterbox filtering) and 4:3 display format (16:9 display format by scaling in TV up converter)		Pan&Scan is not used
Teletext processing to DVB teletext standard	ETS 300 472, s. [5]	Reinsertion in the Y signal
Support for DVB radio programmes		

Feature	Standard/ value range	Notes
Satellite front end		
Demodulation and channel decoding to DVB satellite standard		
Use of the combituners (analogue/digital) of the Sat-6 satellite unit		
Input level area	45...80 dB μ V	to 75 Ohm
Input frequency level	950...2150 MHz	
Input socket	F female, 75 Ohm	
IF wideband	36 MHz	-3 dB
Demodulation	QPSK	
Demodulation	QPSK	
Symbol rate	15...30 Mbaud	1...30 Mbaud adjustable 15...30 Mbaud guaranteed
Forward Error Correction	Viterbi, De-interleaving and Reed Solomon	
Use of the LNC voltage generation of the Sat 6 satellite unit or an optional switch fitted directly on the DVB module		
Option for antenna control	13/18 V, 0/22 kHz, DiS-EqC Tone Burst, DiS-EqC 1.1(partial)	
LNC current	400 mA	

Feature	Standard/ value range	Notes
Audio/video backend		
Interfaces to chassis	FBAS/audio input (SAT6), RGB output, S video/FBAS output, audio output (Stereo)	
Controller and graphics		
Controller	32 bit RISC controller, 50 MHz clock	
Working memory	4 Mbyte DRAM, 2 Mbyte Flash ROM	
MPEG and video memory	4 Mbyte SDRAM	
Graphics	Internal OSD with 720x576 pixel resolution; to 8 bit/pixel, 4 bit/pixel used	
OSD comparison in service mode (background brightness)	Y_nominal+/-6 levels	

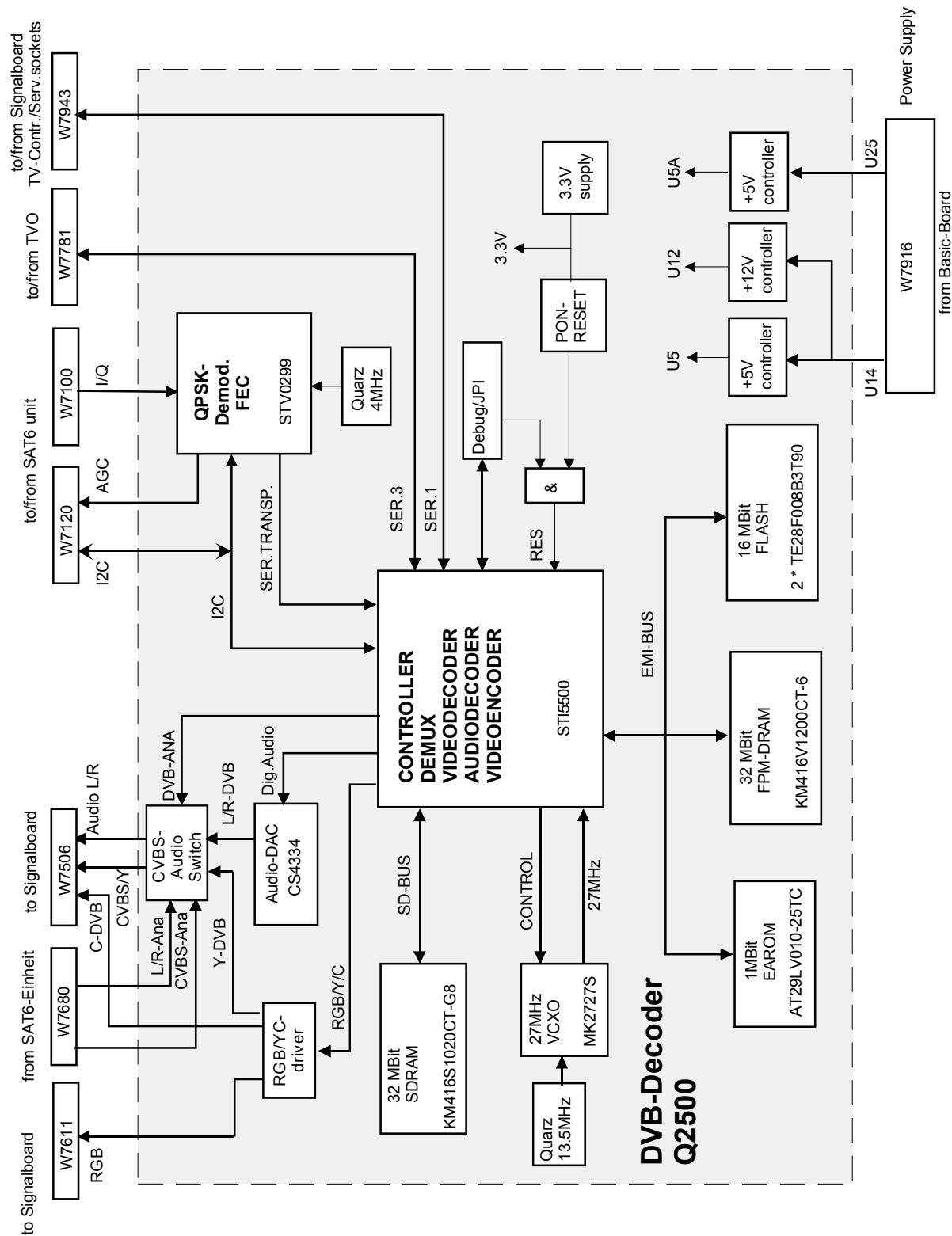
Feature	Standard/value range	Notes
Software		
Local update of operating software	DVB module: via service socket (RS232-Interface, 5 V)	
Generation and update of programme list via various options: pre-programming, frequency search procedure, semi-automatic programme search (manual setting of carrier currents and automatic search for carrier current levels)		
Separate search procedure for DVB television and radio programmes		
Automatic setup of audio channels (default: configuration in menu language) and display of options (menu tree: sound/voice)		
Programme information: Decoding and display of Present_Event and Following_Event via DVB-SI and Teletext		
Generation of an SI database for freely selectable preferred programmes		
With Next-View harmonised Loewe Digital EPG		
Separate Radio EPG		
Detection of encrypted programmes		
Detection of inconsistent data, robust reaction and generation of messages on fault detection		
DVB Service Mode for comparison (VCXO), diagnostics (Test picture) and deletion of DVB-EAROMs		

3.3.2 DVB/TV features

Feature	Standard/Value range	Notes
PIP: DVB in TV or VGA, TV in DVB		Satellite: 2 independent leads and Sat 6 twin fitting necessary!
Automatic picture format switching		
Creation of a common programme list with analogue and digital programmes with special recognition of the digital programmes	„D“	
Separate radio mode with radio programme list		

3.3.3 Architecture

The following block diagram shows the architecture of the DVB decoder for Q 2500.



3.4 Components

3.4.1 Satellite front end

3.4.2 Functional distribution

The satellite front-end processes the signal of the 1. satellite IF coming from the Universal-LNC or Multiswitch up to the MPEG-2 carrier current, fed to the MPEG-2 demultiplexer/decoder. It also houses the components for the supply and control of the antenna units. The functions mentioned are distributed to blocks of the Sat 6 (Tuner, LNC supply) unit DVB decoder (AD conversion, demodulation, forward error correction). The separation is implemented via an analogue/digital satellite tuner in order to be able to use redundancy free processing of TV and DVB signals. The reasons for the choice of interfaces are:

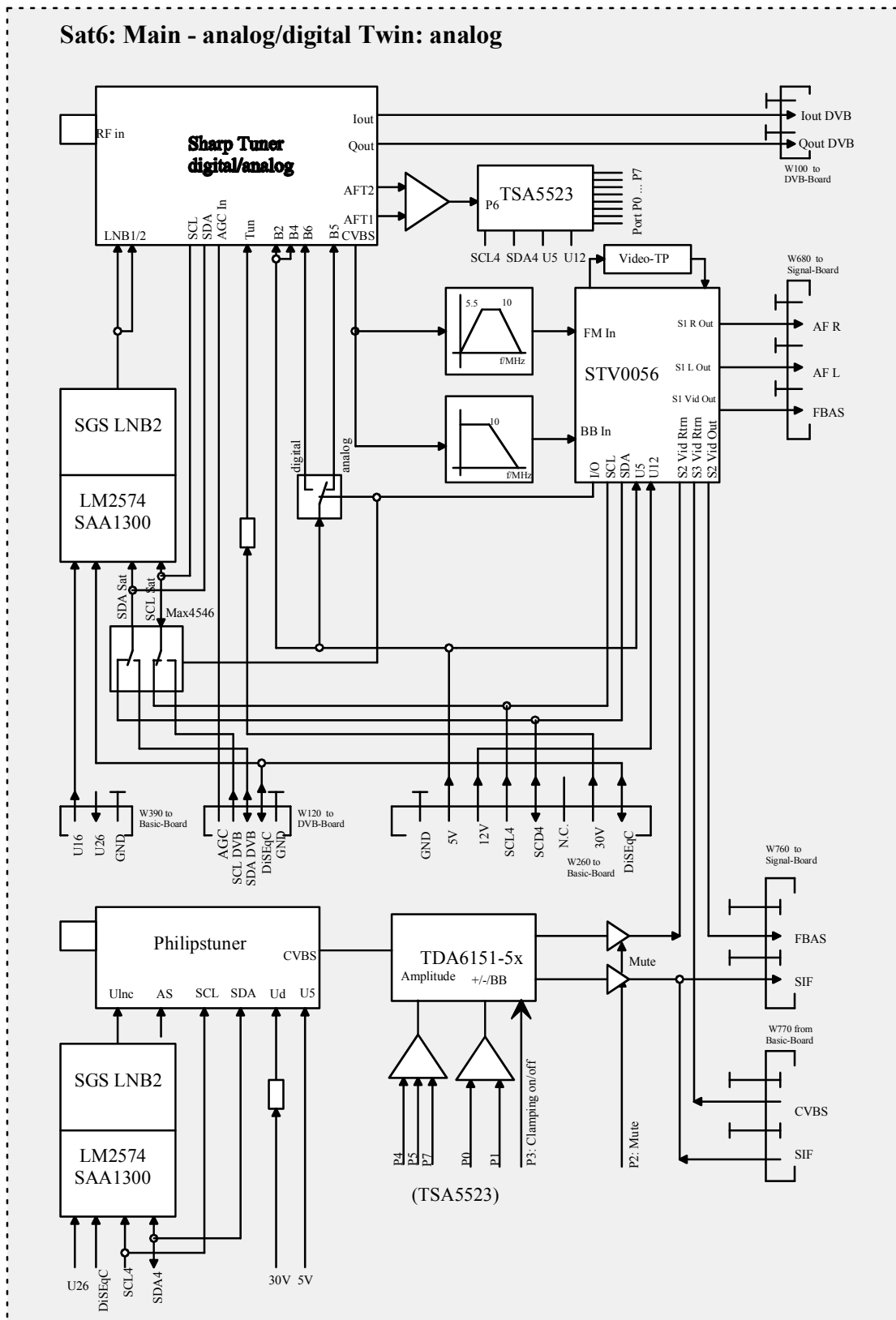
Fewer requirements for the screening of the Sat 6 unit and low-interference quasi-analogue baseband interface to DVB decoder.

Due to the functional unity, the relevant parameters for DVB reception of the Sat 6 unit are specified in the following.

3.4.3 Tuner

The tuner converts the signal of the 1. satellite IF in the base band. Signal processing for analogue and DVB signals is distinguished only in respect of demodulation, and is therefore almost identical with respect to the pre-filtering and amplification stages, mixing on the 2. IF, channel selection and amplification. For this the implementation of an analogue/digital combi-tuner is advised.

The Sat 6 unit incorporates the BS2W7VG2002 (Sharp) analogue/digital satellite tuner



3.4.4 DVB demodulation and fault correction

Additional signal processing comprises:

- AD conversion of the quadrature signals from the tuner,
- QPSK demodulation and channel decoding in the form of Forward Error Correction.

Demodulation and channel decoding are compatible with ETS 300 421. In practice an in-house chip solution is used for all three functions. For reasons of interface compatibility with the MPEG decoder, the STV0299B module from ST Microelectronics is used. There then follows specification of the practical implementation, as well as parameters, which in ETS 300421 are only partially set.

Parameter	Value/algorithm	Notes
Chip	STV0299B	Manufacturer: ST Microelectronics
ADC		
ADC-Type	Dual	
Resolution	2*6 bit	
Sampling Clock	Variable, dependent on symbol rate	Generated by on chip PLL
IQ input voltage	1 Vss	
Demodulation		
Procedure	Coherent grey coded QPSK demodulation	
Symbol rate range STV0299B	1...45 Mbaud	
Symbol rate over all (including tuner) without neighbouring channel assignment	1...30 Mbaud	Lower limit: Phase noise of tuner Upper limit: IF bandwidth of tuner
Symbol rate over all with neighbouring channel assignment	15...30 Mbaud	
Preferred value for symbol rate	27.5 and 22 Mbaud	Used in frequency search procedure
Other symbol rates	Decoding from NIT (delivery system descriptor) of Barker Channel or manual selection	
Roll off filtering	Half Nyquist	
Roll off factor	0.20 (20 %); 0.35 (0.35 %)	
Used roll off factor	0.35 (35 %)	
Carrier recovery	Digital PLL with internal de-rotator and hardware lock-in detector	
Pulse recovery	Internal digital PLL	
Processing of the normal or inverting spectrum		

Parameter	Value/algorithm	Notes
Chip	STV0299B	Manufacturer: ST Microelectronics
AGC	AGC analogue/digital tuner with PWM output. Internal digital AGC on power optimisation within the signal bandwidth.	
AFC	digital software AFC	
<i>Forward Error Correction (FEC)</i>		
1. FEC stage	Viterbi decoder	
- Constraint length	7	
- Rate	$\frac{1}{2}$	
- Other code rates	$\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{8}$	
- Rate selection	Automatic or manual	
2. De-interleaver		
- Synchronous word extraction		
- Convolutional interleaver		
- Depth	12	
3. Reed Solomon Decoder		
- Number of parity bytes	12	
- Block length	204	
- Correctable byte error	8	
- Energy dispersal de-scrambler		
<i>Other</i>		
- Carrier current output	Parallel or serial	
- Used mode for output	Serial	
- Control	IIC bus	
- On Chip Error Monitoring		

3.4.5 LNC supply

The components for LNC supply located on the Sat 6 unit or optionally on the DVB module. The control of the circuit on Sat 6 is by DVB operation via the IIC bus and a free port (DISEqCWR) of the DVB decoder/ controller chip STi5500. In TV operation the TV controller assumes control of the Sat 6 unit. This achieves better decoupling of the software module.

Parameter	Value	Note
LNC voltages	0/14/18 V	
LNC current	max. 400 mA	
Current limitation	Electronic	
22 kHz signal	yes (modular)	
Amplitude pf 22 kHz signal	1 Vss	
Duty cycle	(50 +/- 10) %	
DISEqC version	1.0 and partially 1.1	Write only

4 Signal board

Mounted on the signal board, which is linked to the basic board via connectors, are all the necessary building blocks for device control, interface switching, video, audio and videotext processing.

These are:

- The device control with computer circuit, operating software and the EAROM for the storing of system data and customer specific calibration values.
- Production of system cycle frequency necessary for a digital design.
- The digital IC's necessary for picture signal processing.
- The video/deflection processor for the production and synchronization of control pulses.
- Digital audio processing for analogue transferred information and NICAM decoding.
- The teletext decoder, integrated into the SDA 6000, with page memory, in which up to 3000 text pages, according to design, can be saved and which also generates the OSD for the user control.
- The signal and interface selection by corresponding IC's controllable via the I²C bus.
- Optional IC's for video processing, picture in picture.

4.1 Device control

Full device control is implemented by a Siemens 16 bit processor (SDA 6000) together with Loewe operating software. The teletext function is also integrated into the SDA 6000. A standalone teletext processor is therefore not necessary.

All processes in the digital signal preparation, in the tuners and interface selection are checked and controlled via a microcomputer integrated into the SDA 6000. The processor is also known as the CCU (Central Control Unit).

It also supports the operating, tuning and storage system on the frequency synthesis principle. Without the DVB module there are 220 programme storage locations, and with the DVB board there are 1470. The programme locations are available for TV and also for radio operation. The total number of stored programs must not exceed 220 (1470). For the AV inputs six additional places are reserved.

Operating software is held in an external EPROM. For the storage of c.r.t. and system specific data there is an EAROM for device control. The latter also contains programme location information.

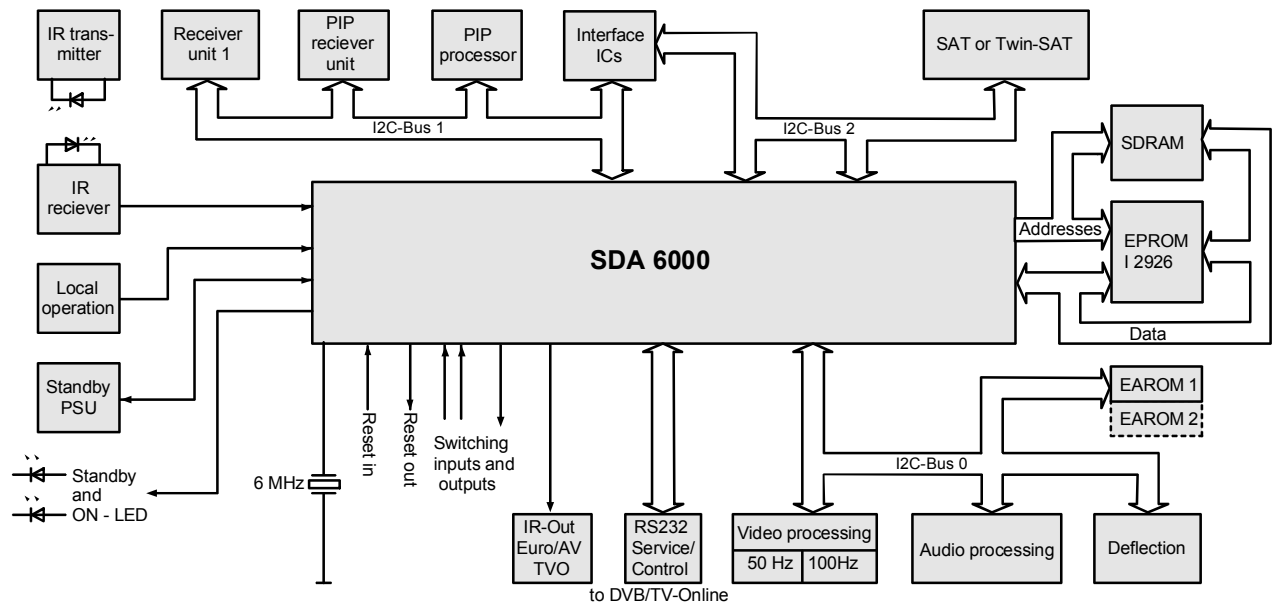
All three modules, CCU, EPROM and EAROM are mounted on the signal board.

The remote maintenance sensor permits control of possible device functions. The chassis tuning is also carried out by remote maintenance.

For this, the sensor IC generates a serial data word for each command that is transferred to the receiver with a delay. This signal is demodulated by the IR receiver and prepared in such a way that it can be sent directly to the CCU as an RSIG signal.

The CCU detects the local operating commands on a line by the different voltage levels.

Block diagram - Device control

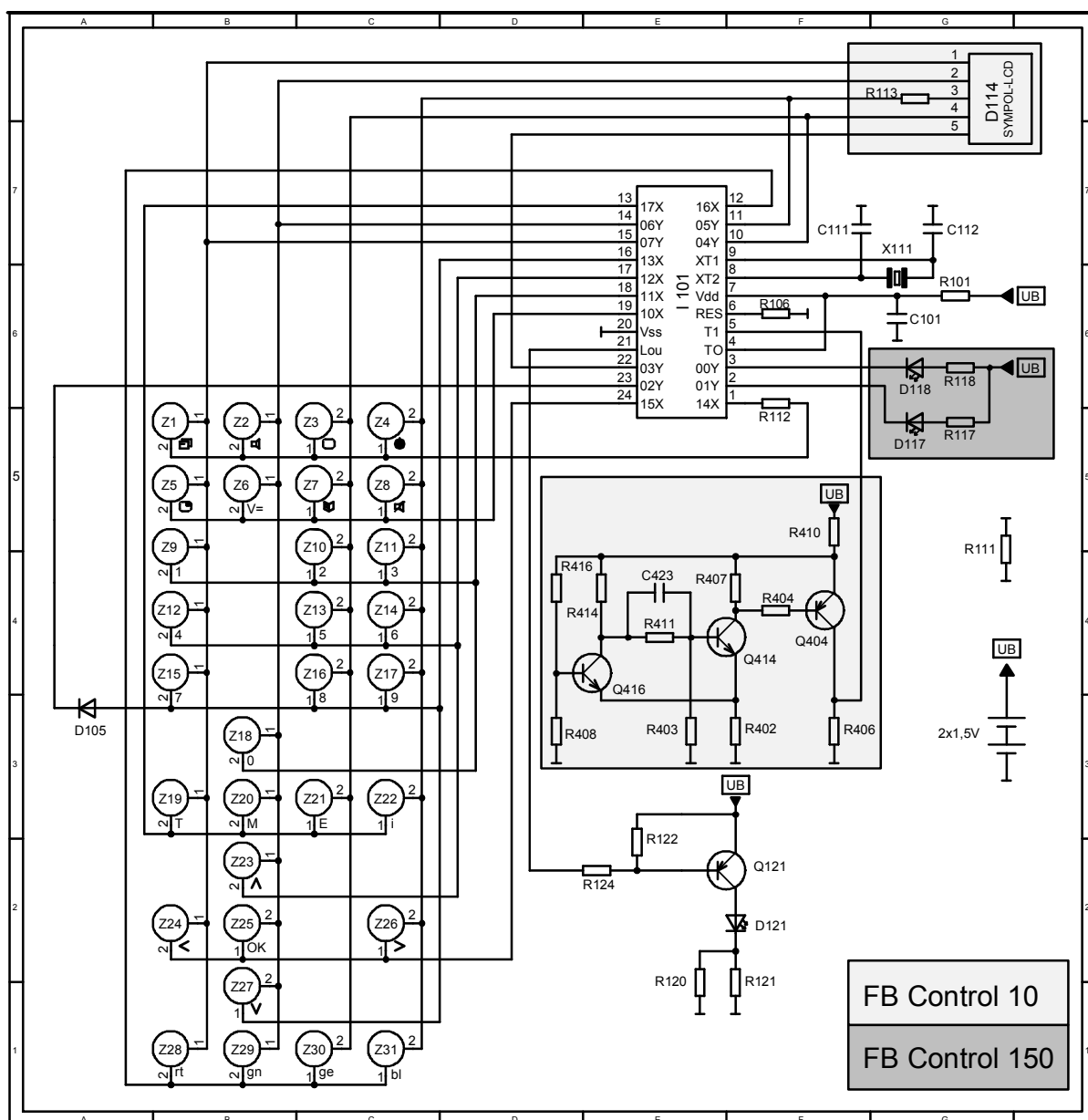


The CCU operates as a central control and information module. The software is held in as external EPROM. It concerns data necessary for the control of the digital IC's, tuning, OSD's etc.

For control of all processes in the device the C 161 bus system:

- generates I²C bus 0
transmits data to and from the EAROM. In addition it controls the picture and audio signal processing.

- generates I²C bus 1
controls the 1st and 2nd receiver unit on the basic board, the switching IC's for the audio and video signals on the signal board and the optional PIP processor.
- generates I²C bus 2
controls the satellite units and partially controls the switching IC's for audio and video.



4.1.1 The infrared sensor

With the state-of-the-art IR transmitter all device functions, with a few exceptions, can be controlled remotely. Starting with on/off via control functions such as volume/contrast, to control of the satellite antenna.

To ensure remote control of all functions, buttons must have double or extended switching functionality.

Operation is via a well-organised menu structure. For this a cursor cross is provided on the remote control. In addition, frequently used functions can be assigned to the four colour keys. This does not set the command in the remote control, but a corresponding value in the device software. In the high-quality system

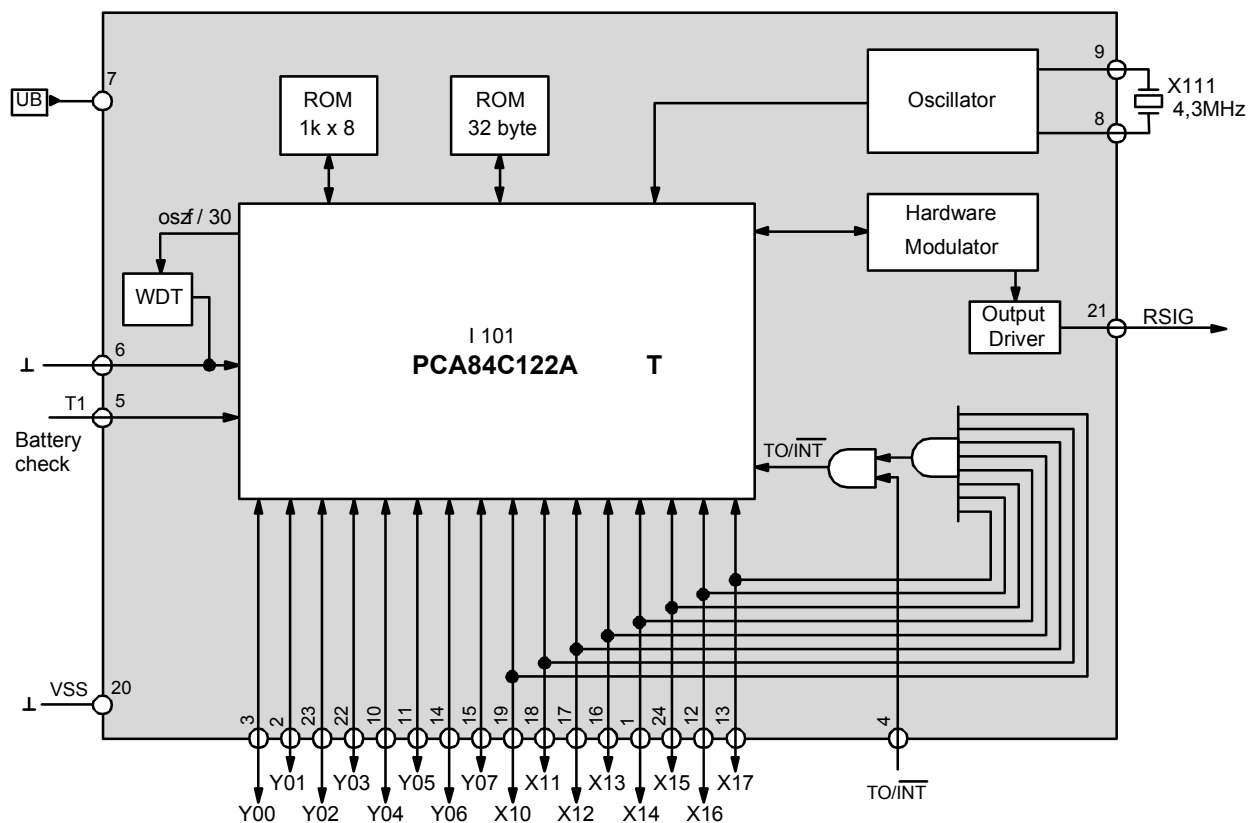
range device the various functions are supported by an LCD display.

An 84 C 122 Philips microprocessor is used in the remote control for the Q 2500 chassis (Control 10 for Loewe Systems and Control 150 for Loewe.). This is an 8 bit standalone microcontroller, especially designed for use in infrared remote controls. It has very little external wiring and is able to control the transmitter diode directly via an amplifying transis-

tor. The modulator is incorporated into the IC. The processor is equipped with Loewe specific software, which is mask programmed. To operate the Q 2500 chassis, commands are issued as RC 5 code, level 0.

The operating commands are formed on the transmitter keyboard by linking a Y input (Y4 Y7) with an X input (X10 X17).

Internal circuit 84C122



The operating commands for videotext are specified as a sub-program in "Level 0".

The transmitter IC produces a code word for each command and adds two start bits and a control bit. The two start bits are always H, and the control bit changes each time the button is pressed. It indicates to the central control unit, whether a new command is present, or the current command is still valid.

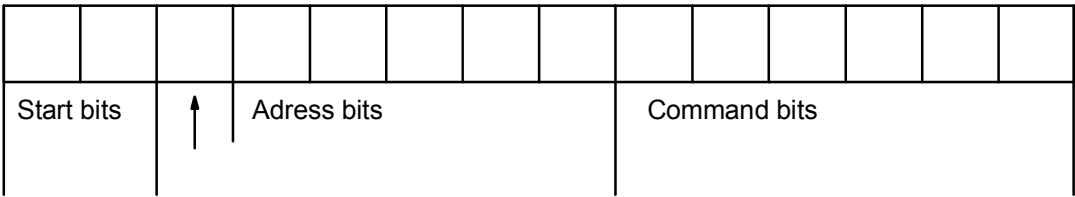
This 14 bit codeword is modulated with a 36 kHz carrier and applied serially to pin 21 of 84 C 122.

The digital Information is expressed by the step direction within the bit (Biphase).

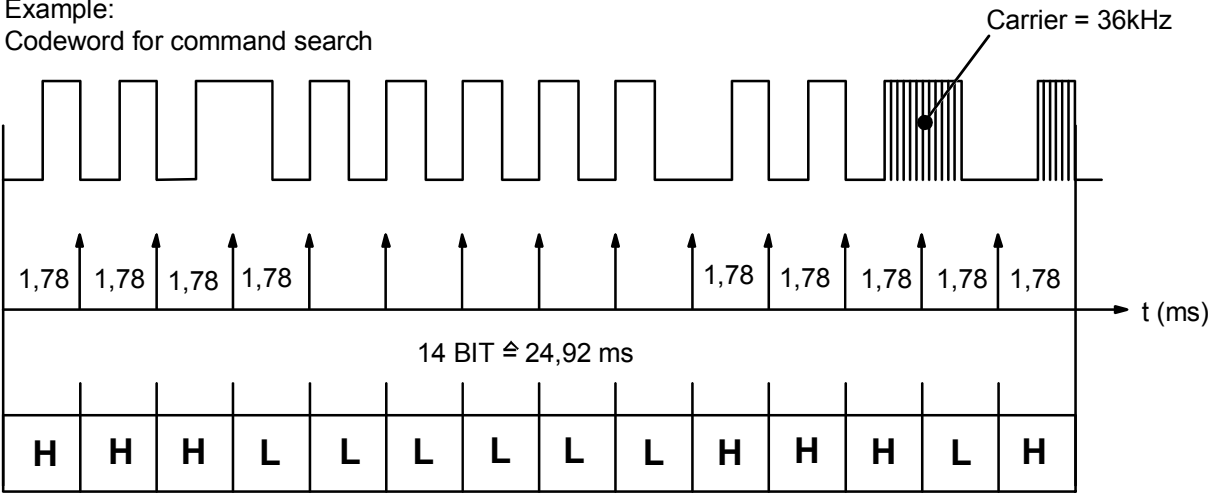
If the button is pressed for a long time on the report control the codeword is repeated after 114 ms.

This signal is supplied to T 121 via resistor R 124, amplified and radiated via infrared diode D 121. The transmitter diode is now no longer covered by a dispersion window. This means the current can be reduced to f 900 mAss. The current can be taken directly from the battery, which means that no additional Elkos are necessary on the operating voltage.

14 BIT - Codeword



Example:
Codeword for command search



On pins 8 and 9 of 84 C 122, the ceramic oscillator X 111 is the component that determines the frequency of the pulse oscillator for the synchronisation of the system and for the production of the carrier frequency ($f_{Tr} = 1/12$ fCycle). Using the ceramic oscillator X 111 means that tuning of the cycle frequency is not needed.

The circuit is functional at an operating voltage of 2.5 – 3.5 V and draws a normally energised circuit current of = 1 uA and an operating current of 35 mA. The transmitter thereby achieves a range of >10 m. The voltage source is two micro-alkali-manganese batteries.

After switching to the service mode, chassis tuning is implemented with the FB transmitter. The service mode is called up by pressing the functional button “?” four times, so that the “Service” display appears, and then pressing the “M” button on the remote control within one second. Then using the curser buttons, the individual tuning functions can be called up. Tuning is also carried out using the cursor keys. The data is initially stored in the working memory C 161 and is only transferred to the memory on operation of the "ok" memory button. Once returned to normal FS operation, use the "E" button to return to remote operation.

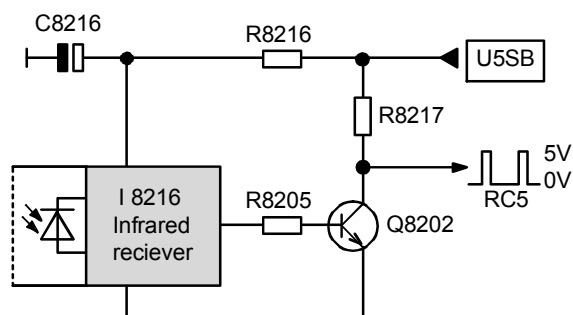
Pressing the Z 1 button switches the remote control processor to another mode. This means that the transmitter can be used for both a videorecorder and DVD player from Loewe. For the videorecorder, however, control is only possible with Korythso code, as used by Panasonic. For the DVD player we use the RC 6 code.

If the remote control is not used in the video-recorder or DVD mode for 20 sec, then it automatically switches back to the TV mode. The video or DVD mode is displayed for Control 10 by the LCD and for Control 150 by an LED on pin 2 (Y1) and pin 3 (Y0).

For Control 10 the LCD is controlled from ports Y3 to Y7. Up to Y3 these are also used to query the button matrix.

The operating voltage is also monitored in Control 10 and displayed correspondingly in the LCD. Measurement of the battery voltage is carried out by transistors Q 416, Q 414 and Q 404 on pin 5 of 84 C 122.

4.1.2 Infrared receiver



The IR receiver on the local control unit is a thick film circuit and is fully encapsulated.

The IR signal from the transmitter is converted into an electrical signal by the receiving diode, amplified and prepared in such a way that it is available on the output as 2 Vss.

With the next transistor Q 8202 on the local control unit the signal is amplified to 5 Vss. In this way the IR decoder in SDA 6000 can be safely controlled via pin 5

Via IC I 2716 and transistors Q 2721, Q 2731 and Q 2741 the IR signal is applied to pin 8 on each of the three Euro sockets. This allows hidden videorecorders to be remotely controlled via the IR receiver of the television set and the AV switching voltage line (see AV operation).

Via Q 2823 the signal reaches transistor Q 2862 on pin connector W 1076. Via W 1076 the IR signal is supplied to a connected online-box.

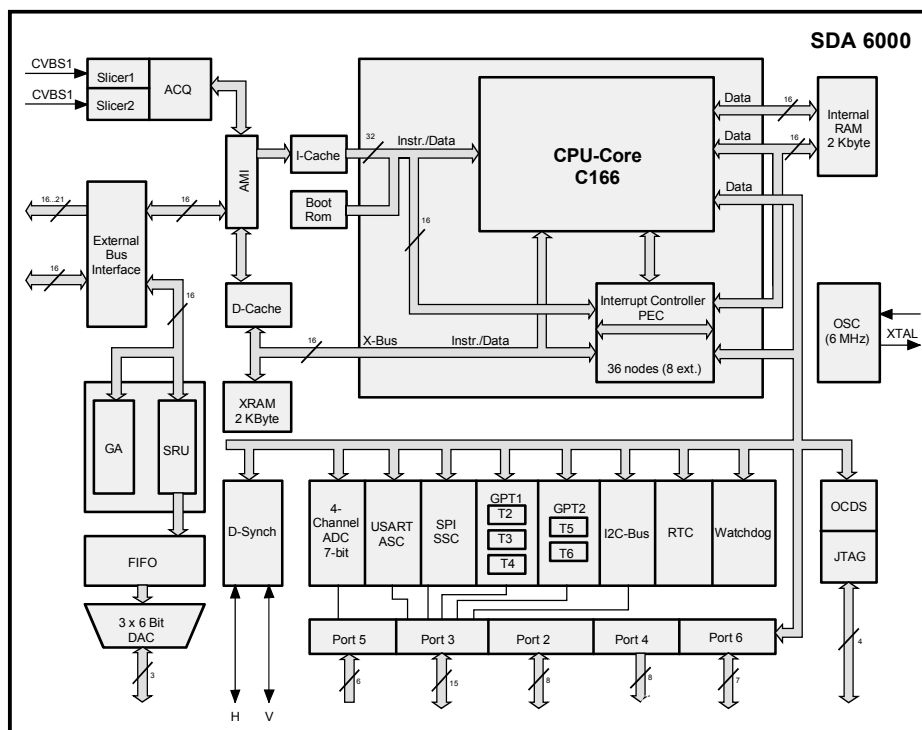
The pulse width for the RC 5 code of the remote control is about 900 μ s. If a connected Multi Media Component is operated with the Control@media IR keyboard, the data is not transferred with the slow RC 5 code, but with an RC MM code (MM-Multi Media) designed for fast data transfer. The pulse width for the RC MM code is 167 μ s.

The pulse width of 167 μ s requires an IR-receiver with a very short time constant. Therefore, in Multi Media devices a special IR receiver is used, which for operational pur-

poses cannot be replaced by one from a normal TV set.

A Siemens SDA 6000 is used in the Q 2500 chassis for control of device functions. This 16 bit processor is a development of the C 166 family of single chip CMOS microcontrollers. It combines excellent CPU characteristics of up to 8 million computation operations per second with high functionality, flexibility and high capacity input and output ports. The SAD 6000 has 5 Ports (Port 2 – Port 6) with a total of 44 inputs and outputs. It was designed especially for applications, where cost plays a critical role. This makes the processor suitable for use in colour TV sets.

4.1.3 The SDA 6000 central control unit



In the Q 2500 chassis the processor must fulfil the following functions:

- Oscillator for generation of the CPU cycle frequency.
- Generation of the clock frequency for the bus systems.
- Processing of the RSIG signals and local operation commands.
- Generation of the I²C bus systems for control of the HF/IF units, processing of pictures, video text, PIP and audio, for communication with the memory IC, the SAT receiver unit and the interface selection.

- Control of LED's for operating and standby display.
- Creation of further switching processes, e.g. ON/OFF, AV transfer, etc.
- Simulation of a clock synchronised by VPS-information.
- Timer function for programmable disconnect time and recording timer.
- Code converter for IR commands for the remote control of a video recorder via the AV voltage switching line and the Dolby surround unit.
- RS 232 for communication with the online as well as the DVB module.
- Digital Link Plus Control for the 3 Euro/AV sockets

In order to fulfil the required tasks the following circuit components are combined in one chip:

- C 16 core with CPU and interrupt controller
- 2 kByte XRAM as working memory
- Interface for the external ROM
- Quarz controlled clock generator
- Interface for the three I2C buses
- Multifunctional timer
- IR decoder
- ON/OFF Flip-Flop
- Reset circuit for internal reset
- Reset circuit for external IC's.
- Ports P2 to P6 with 44 input and output pins.

Many of these functions are implemented not by the hardware of the processor, but by the Loewe-specific software.

4.1.4 Reset

For correct functioning of the device, various reset pulses are necessary. The first required is a reset on pin 73 for the SDA 6000, as soon as its operating voltage U3.3 is available and the 6 MHz system cycle has run. This reset is produced by I 2941. After this reset the SDA 6000 starts to operate and implements and emits control commands.

The microprocessor also has a reset on pin 8, produced by I 2946, if the circuit power supply has run and all IC's have an operating voltage. This reset is retarded in SDA 6000 and then emitted from pin 100 to the digital IC's.

RESET digital component input pin 8

The reset for this input is formed by a steep positive flank. As U3,3 is the last voltage switched by the power supply unit, this reset is coupled to the voltage. The reset pulse is created in I 2946 and is present on pin 8 of the microprocessor, if all IC's in the chassis have an operating voltage. SDA 6000 can then begin controlling the IC's. In addition the processor also reacts, if the reset is not present on pin 8 or during operation. Normally 5 V is always felt on a reset input, provided the device is fully switched on.

RESET digital component output pin 100

Via this pin the microprocessor sends the reset to the other circuits. This is coupled to input pin 8. In this way the processor can monitor the reset, and for transient voltage failures can prevent, the level on the reset line collapsing. On the other hand, the circuit also makes it possible for the SDA 6000 to emit a software controlled reset on pin 50 during operation

In standby and on start up L level is initially felt on pin 100. Not until the SDA 6000 switches pin 100 to H level, does the L/H flank produce the reset for the IC's. During operation the reset inputs must be held permanently at H level, otherwise the working register will be deleted.

This reset reaches MSP 3410 /pin 21, and the two VCP 3230/33 /pin 15.

All other IC's either do not need a reset or generate it on switching on the operating voltage.

4.1.5 Creation of cycle frequency

The internal oscillator of SDA 6000 is synchronised with a 6 MHz quartz on pins 108 and 109. The cycle frequency for the bus systems is obtained from this frequency by internal distribution. They are from 70 to 400 kHz respectively for the I²C bus systems. The cycle frequency is transferred under software control depending on the current function.

4.1.6 Operational commands

The SDA 6000 receives operational commands as serial data information by RSIG signal on pin 9. The local operating commands are applied to the CCU on pin 126 as various voltage values.

Pin 126 operates as an ADC with 6 bit resolution. By various voltage dividers on the three operating unit buttons, various voltage levels are produced.

The voltage levels are digitised by the ADC, and based on the measured values the CCU issues the appropriate commands.

The following voltages are produced by manipulation of the various buttons:

-
- “+” button - 0.5 V
- “-” button - 1.1 V
- “ ” button - 1.8V

The overtravel contact is connected to pin 93 of the CCU.

4.1.7 LED display

The red standby LED is controlled via pin 96 of the CCU. In operation the remote control commands in RC5 code are acknowledged by transient illumination of the LED. For standby operation the pin is set to the H level and transistor Q 2853 thereby conducts, whereupon the LED illuminates. The ON LED is controlled via pin 78 with the ON/OFF-command. When the power supply is switched on this line is set to the L level, whereby the green ON LED also illuminates. SAT standby operation is indicated by illumination of the two LED's.

4.1.8 ON/OFF function

If a switch-on command is present, the output ON/OFF, pin 78 of the CCU is set to L level. This blocks transistor Q 8111 in the standby power supply, whereupon Q 8114 conducts and attracts the relay. The system voltage is able to reach the main power supply, which begins to operate.

The device starts operating at the selected program location. The output is once again set to H level by an off command.

With an ON/OFF command the two transistors Q 2961 and Q 2966, which form part of the mute circuit, are switched, thus suppressing input and output noises.

4.1.9 Protective circuit

In order to avoid excessive high voltage, c.r.t. defects or other serious damage due to faults in the vertical deflection, caused by excessive beam current, the device is switched to standby. In addition, pin 94 of the CCU is set to H level. In normal operation L level is present (see description basic board Section 5.2 – 6.2).

If an error occurs – H level on pin 94 of the CCU - the CCU switches the device after 2 seconds to standby operation.

4.1.10 AV operation

The circuit is designed so that AV operation with switching voltage on programme locations can be programmed.

Setting is implemented in the menu under connect AV device.

The menu makes clear the exact procedure for setting up or you can refer to the overview in the operating instructions. Monitoring of the switching voltage on pin 8 of the AV socket is implemented via transistors Q 2737/Q 2726 and Q 2746 for AV1/AV2 and AV3. The three emitter followers are connected respectively via voltage dividers to pins 125/124 and 127 of the CCU.

In accordance with the Euro/AV standard, pin 8 of the AV socket is defined as 6V (16:9 operation) and 12 V (4:3 operation) AV operation.

The CCU monitors these voltages on its AV pins. By division of the respective voltages $6V = 1.3V$ and $12V = 2.6V$ on the pins of the CCU. If a switching voltage is detected by the CCU, this switches over to AV operation on corresponding menu selection.

• IR signals

For the remote operation of VTR devices via the TV-IR receiver the RSIG signal is applied to the Euro sockets pin 8.

For this two signal paths are provided. In normal and standby operation SDA 6000 pin 9 at H level switches transistor Q 2823, and pin 97, which is also on the signal path, is made high-resistant from SDA 6000, to avoid interference. Via Q 2823 and I 2716 the RSIG signal is passed on to the transistors for socket selection. Use of the recorder remote control is necessary for this.

There may be applications, however, for which the video recorder remote control is not available and the TV remote control emits another code that the recorder does not understand. For this a video menu is provided in chassis Q 2500, which is called up in the remote control with "V=". This allows the basic functions of the recorder to be used. If for "Connect video devices" three devices are selected, they can all be controlled independently of each other.

In this operating mode the RSIG signal present on pin 5 of the CCU is controlled internally via a code converter and then output via pin 97 of SDA 6000, which is now low resistant. The other signal path is identical with the first possibility.

The code converter changes the RC 5 data words of level 0, as they are delivered to the IR receiver, to those of level 5, with which the video recorder operates. Secondly, the code converter changes the RC 5 command into the corresponding data word of the NEC code. Thirdly, the RC 5 commands are converted into the Korythso code.

The three data words, both RC 5 of level 5, as well as the NEC code word and the Korythso code word, are emitted serially by SDA 6000 pin 97. This means that remote control of recorders that operate with RC 5, NEC or Korythso code is possible.

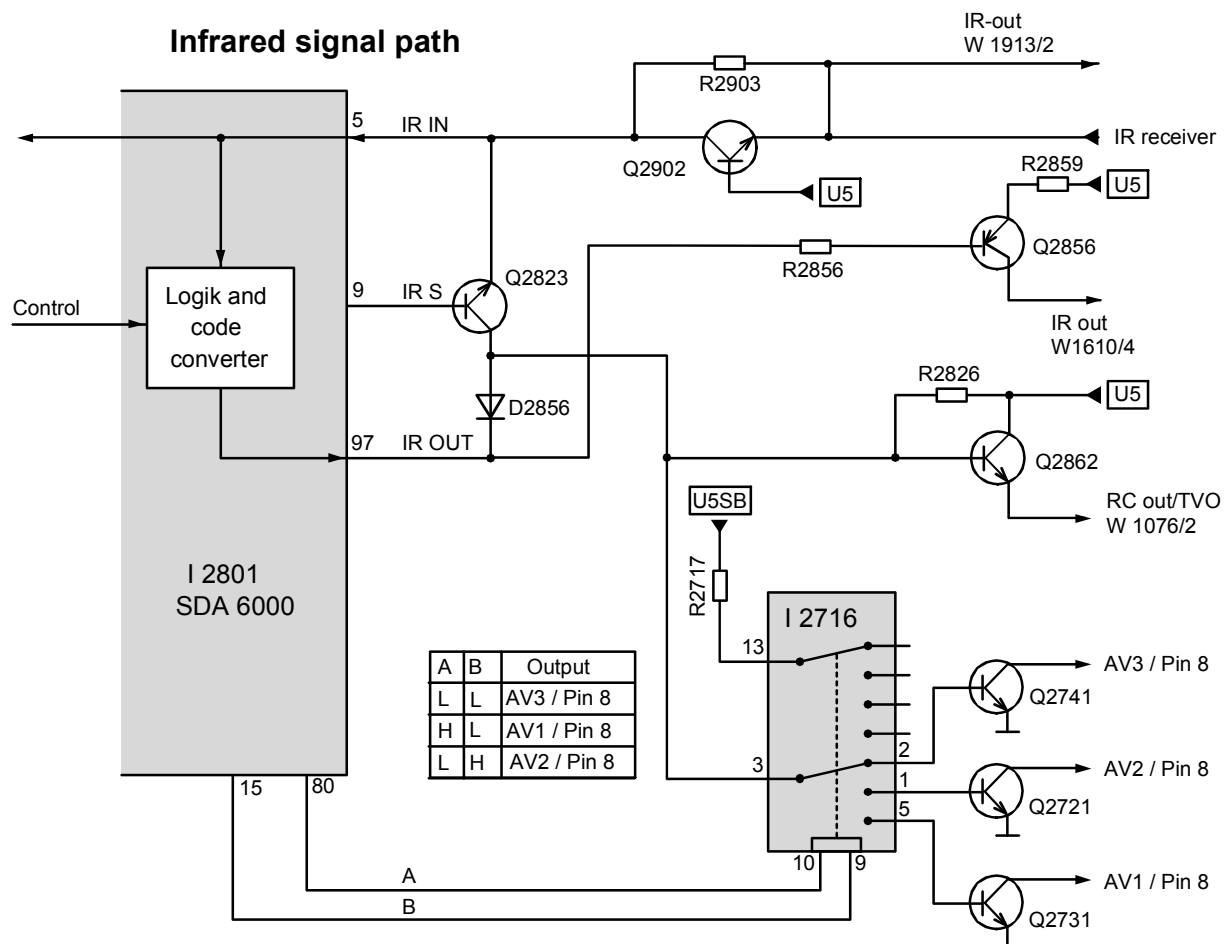
Of course, a recorder must be used that can process the remote control signal coming from the AV switching voltage line. For this most Loewe recorders have a converter.

During output of the converted IR commands transistor Q 2823 is blocked with L level on pin 9 of the CCU. This prevents these signals being affected by IR signals from the receiver on the operating component.

In order to achieve separate operation of the three devices connected to the two Euro sockets, the circuit also contains RSIG signal switching controlled by the CCU.

This switching is implemented by multiplexer I 2716. The IC is controlled by the CCU via the outputs pin 15/80. According to the status, see table, the IRIN/IROUT signal is switched to the respective Euro/AV socket.

An optional online module can be controlled by transistor Q 2862.



The software for the RSIG signal switching is fitted with a load memory function. If there is no information about which socket should be used RSIG is applied to AV 1. If another socket is selected, the signal is then applied to this socket. If no socket is selected, the signal is applied to the one last used. This is true also for standby.

4.1.11 SAT standby

In order to create a situation where a video machine can also receive signals from the SAT receiving unit, which is integrated into the unit, without the TV set needing to be in operation, the horizontal output stage in this operating mode is switched off. This is achieved by an H level emitted via pin 79 of the CCU. This switches transistor Q 2951 and the horizontal control pulse from the video/deflection processor TDA 9332 is lead to earth.

As both the vertical and the RGB output stage obtain their operating voltage from the diode split transformer, this allows the entire c.r.t. to be switched off and the power input in this mode to be reduced. In normal operation pin 79 of the CCU is at L level and transistor Q 2951 is high resistance.

The c.r.t. is switched off when:

- a) a timed recording for a video recorder is being processed in the TV set.
- b) on switch off using the remote control, if previously, via the video menu, a recorder has been set to record.
- c) on switch off using the remote control, if previously overplaying between the sockets of the TV has been activated.
- d) Radio – operation is activated (after 20 sec.).

In all these cases all other stages of the chassis are fully operational. Except for d) the sound in the MSP 3410 is switched off via the I²C bus.

4.1.12 SAT unit control

Control of the Sat/TwinSat unit is implemented by the CCU via the I²C-Bus 2.

The SAT unit VI used is also able to control appropriately equipped switch boxes or LNCs via DiSEqC Level 1 (Digital Satellite Equipment Control). In this system pulse modulation of the 22 kHz signals allows data to be exchanged between receiver and peripheral devices. This means that the current different LNC supply voltage switching information, 22 kHz and control function will be replaced and simplified by separate control lines.

In the standard, a logical 1 is defined as 11 periods of 22 kHz signals (0.5 ms) followed by a 1 ms pause (22 periods). The logical 0 is represented in reverse, i.e. 22 oscillations (1 ms) and then a 0.5 ms pause (11 oscillations). For this, each bit requires 1.5 ms for the transfer, which corresponds to a maximum transfer speed of 666 bits per second. After each

transferred telegram, there must be a pause of at least 6 ms (132 periods).

Control is implemented according to the Single Master - Single/Multi Slave principle. Master is always the SAT receiver, and the external components (LNC multiswitch, etc.) are the slaves. Therefore, each communication from the receiver is started and the external components can only transfer data, after they have been requested to do so by the master.

A command from the master contains a 1 byte frame, a 1 byte address, a 1 byte command and 1 or more bytes of data. The responses consist of a 1 byte frame and 1 or more bytes of data. Each byte is always followed by a parity bit (P) for error checking.

The frame byte determines, whether the data is sent by the master or the slave. The address byte contains the information that determines which peripheral module (switchbox, LNC) is addressed. The command byte determines which switching function is to be implemented (selection LNC, level switching). In the data byte additional information can be exchanged. There is still enough free space in the DiSEqC command set for future requirements. This means that the system has built in futurability.

For the DiSEqC control the SDA 6000 has an input and output respectively. Communication with the SAT unit in the device is via a common line on connector W 1211, pin 7 on the basic board and from there via W 250, pin 8 on the SAT unit.

Pin 90 of the CCU is used as an output for the control of peripheral devices. The 22 kHz-signal on the SAT unit is switched using the H level. By switching between the L and H level the 22 kHz is switched by the SAT unit for the required period and a command is then issued via the coaxial cable.

If the SDA 6000 is waiting for data from a peripheral device, then the 22 kHz must be switched at L level on pin 90. The device addressed dampens the 22 kHz signal for the required period by changing the input impedance, so that the data can be transferred to the SAT unit of the TV set. The SAT unit changes this signal into L and H pulses of the same duration, which are applied to connector W 1211, pin 7 on the signal board. The signal is inverted in transistor Q 2831. The DiSEqC information is then made available to the SDA 6000 on pin 7.

4.2 Bus systems in Q 2500 chassis

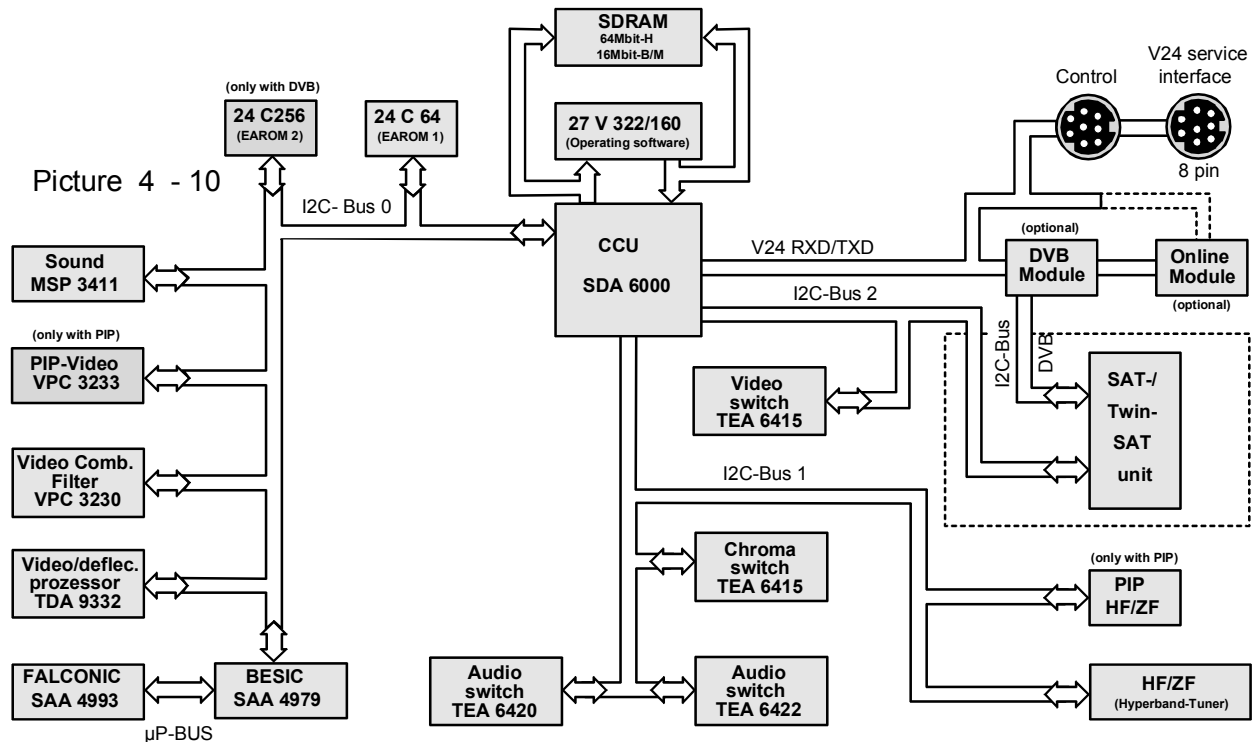
Several bus systems are used in order to implement the large number of switching and control functions of the Q 2500 chassis in a reasonable time, and for error-free addressing of the ICs.

For this the SDA 6000 generates three I²C-bus systems with which the memory IC, the control ICs for the HF/IF component, the ICs on the SAT unit, the converter for video and audio, the building levels in the video section, for PIP and multi-sound processor are controlled

The I²C bus systems 1 and 2 on the other hand operate with a common clock line and separate data lines. The I²C bus system 0 operates as usual with separate data and clock lines.

In all I²C bus systems there is constant data traffic. If the Bus Stop command is issued or the device is started with the Power On command, the bus lines are then set to 5 V d.c.

Q 2500/H bus systems

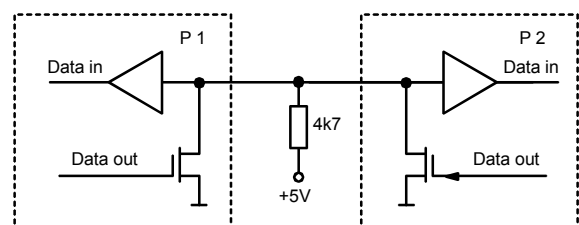


4.2.1 I²C bus systems

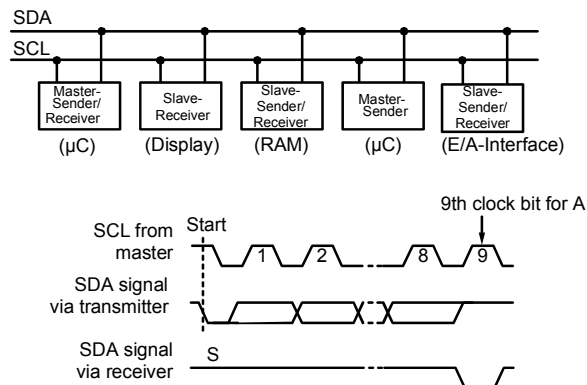
The I²C bus is a two-wire bus system consisting of a DATA line and a clock line. This bus system permits the serial and bi-directional exchange of communication between several microprocessors and peripheral ICs that possess an I²C bus interface. This means that the number of connections is reduced, which results in a simplified switching structure, and increased reliability (fewer solder points, connections, contacts, etc.).

Via pull-up resistors, both lines are in a state of rest (i.e. no data transfer) at H level. Data transfer starts if a clock line is "High" and a negative flank (H > L) appears on the DATA line (Start condition). Evaluation of the data occurs during the H level of the clock pulse.

Data inputs/outputs in I2C bus



The end of data transfer (Stop condition) occurs on signalisation of a positive flank (L > H) on the DATA line and concurrent H level on the clock line.



Up to 400 kbit/s can be transferred via the I²C bus interface of the SDA 6000. The data and clock impulses are switched by software switching logic to the respectively required bus connections.

The CCU operates on its I²C bus outputs with a level of 3.3 V. The other ICs and components operate with TTL level. Adaptation of the CCU level to the TTL level is by transistors Q 2883/86/88/91 and Q 2893.

The following functions are controlled via the I²C bus systems:

I²C bus 0 with SDA 0 and SCL 0

Only the EAROM I 2931 is connected to the I²C bus 0. This memory contains all start values and customer specific values. The data is selected here on start up and when making adjustments or writing to the EAROM on shut down and for memory processes.

If a DVB module is retro-fitted the second EAROM I 2936 is also used. Programme data from 220 to 1470 is stored here.

- Multi-sound processor MSP 3410 to IF- and VF processing.
- The video processor VPC 3230, I 2271 for digitising of input signals and processing in the main signal path. It conducts the digital Y/UV signals to the I 491 memory.
- SAA 4979 for conversion of the digital Y and C signals into analogue Y, R-Y and B-Y signals and for the control of the digital 100 Hz processing with the two half picture memories and the SAA 4993.
- The video/deflection processor TDA 9332 for generation of the RGB control signals for the c.r.t. plate and for generation of the deflection pulse
- Video processor VPC 3233, I 2151 for PIP signal processing. The digitised Y/UV-signals are fed to the two PIP synchronous memories I 2161/71.

The I²C bus has a maximum cycle rate of 400 kHz.

I²C bus 1 with SDA 1 and SCL 1

Just like the I²C bus 0, fixed pins are also provided for the I²C buses 1 and 2 in the SDA 6000. Buses 1 and 2 operate with a common clock line and separate data lines. Data is switched to the respective line for the required bus in an internal transfer switch.

The following are connect to the I²C bus 1:

- The tuning and transfer IC's on the receiver units in the basic board.
- The transfer IC's for video (1 x TEA 6415) and audio (TEA 6422 and TEA 6420) for the interface on the signal board.

The I²C bus 1 operates with a cycle frequency of 100 kHz.

I²C bus 2 with SDA 2 and SCL 1

The Sat or Twin Sat unit is controlled from the SDA 6000 via the I²C-Bus 2.

There are tuning ICs in the receiver unit. Generation of the tuning voltage and control of the band and standard transfer or LNC supply on the SAT receiver.

4.2.2 IC 24C64 memory

A 24C64 64 kbit memory is used. To distinguish this EEPROM from the similarly sounding EPROM it is given the designation EAROM.

In addition to system data for the digital ICs the EAROM also contains user specific data. This is programme related location data such as channel, reception range, standard, etc., as well as customer specific tuning values for brightness, volume and contrast, for example.

The 24C64 has a memory capacity of 65536 bits, and is organised into 8192 x 8 bits. The memory life is at least 10 years, with more than 1 million write and read actions guaranteed. Inputting and outputting of data is controlled by the SDA 6000 and implemented via the I²C bus 0. For this the CCU generates an 8-bit address word preceded by a start bit. The 8-bit value is composed of a 7-bit word for the IC address and one bit, containing the on or off command.

This address word is checked by the IC's connected to the system for conformity with the address words they hold, and receipt is acknowledged by an acknowledge bit from the appropriate IC. In the socket the master IC (SDA 6000) transfers the storage location address. This address consists of two 8-bit words, receipt of which is acknowledged by an acknowledgement bit for each bit respectively. If this occurs, the 8 data bits are transferred to

or from the memory IC and receipt is confirmed by the appropriate IC.

Transfer of the data described is implemented via line SDA 0 and is synchronised by the clock on line SCL 0. After transfer of the last acknowledgement bit, the command "Input" sets the save procedure in motion. During the save procedure the inputs SDA and SCL of 24C64 are locked, in order to prevent any external interference with the memory during this time.

After the start up routine the system data is read from the memory by the SDA 6000 via the I²C bus and then the data is transferred via the I²C bus systems to the appropriate digital IC's.

To prevent inadvertent deletion or overwriting of the memory on start up or shutdown, the Write Protect line pin 7 of the two EAROMs is connected via Q 2943 to the Reset line. In the start up and shut down phase, pin 7 of both EAROM's is switched to the L level. Inadvertent deletion or overwriting is thereby prevented. In the operating state H level is applied to pin 7.

4.2.3 EPROM M 27 C 322

Device specific software is held in EPROM I 2926 as non-volatile data.

An IC with 32 Mbit memory is used. The memory is divided into 2097152 x 16 bit areas.

Data transfer from the EPROM to the computer is implemented via connections D0 to D16. The memory addresses, from which the data is recalled, are transferred previously via lines A0 to A 20.

4.2.4 SRAM

Data that is necessary for the functioning of the CCU is temporarily saved in the 64MBIT DRAM I 2916. Owing to additional functions in the EPG and DVB the internal RAM area in the CCU is no longer sufficient to store all the data required. Up to 3000 videotext pages are stored in this DRAM.

4.2.5 Search functions

On implementing the search function by pressing the appropriate button the SDA 6000 permits the SAA 4979, via the I²C bus, to output permanent blank in the blank stages. In this way the picture is sampled and using another command from the MSP, the sound as well.

The required frequency is communicated as a whole number multiple of 62.5 kHz from the SDA 6000 via the I²C bus to the tuning IC. From the tuner each set oscillator frequency is present as the actual value. It is sub-divided in the IC and compared to a reference frequency. The sub-multiple ratio is determined by C 161.

Using internal UP and DOWN pulses the tuning voltage is delayed until compatibility is reached. The PLL engages and communicates this to the SDA6000 via the I²C bus. It then requests the VPC via the I²C bus for the available standardised synchronous signals. If synchronous pulses are present, the permanent blank is lifted. In the event that there are no synchronous signals, the SDA 6000 communicates to the tuning IC the next highest sub-multiple and the tuning procedure begins anew. The search procedure only stops when a transmitter is found. The SDA 6000 determines this by querying the VPC about the synchronous pulses present.

During the search procedure the channels are searched in ascending order within the selected standard. For the PAL B/G, SECAM East, NTSC Europa and SECAM L standards, cable channels are also searched.

On transfer from one FS band to another, the corresponding band switching information is automatically switched at the same time. Depending on the device settings changing of standards is carried out either automatically or manually.

If no transmitter is detected in the selected channel on the normal frequency, the channel is searched from its lower limit in 1 MHz steps. If a transmitter is still not found, the system jumps to the next highest channel.

4.2.6 Storage

If a channel has been found and the correct standard set by the search procedure or direct input of a channel, it can be saved to any programme location between 00 and 220. In addition, all tuning and switching information is written to the EAROM via the I²C bus.

4.2.7 Programme recall

For programme recall the required programme number is input to the SDA 6000 via the remote control. Via the I²C bus it requests the EAROM to communicate the details of this storage location (division ratio, fine tuning, FS standard). This Information is passed via the I²C bus from the memory to the SDA 6000, which then passes it to the tuning IC in the tuner. The IC sets the band switching outputs to the required band and required standard and moves the tuner oscillator to the allocated frequency. The fine-tuning value is also considered with respect to the oscillator frequency and corrected by the AFC. The tuning remains on the required frequency, even when no transmitter is available.

4.2.8 System clock

A realtime clock is integrated into the SDA 6000 to enable timer functions for transmitters without videotext and timed SAT standby programming.

It consists of a computer-integrated time switch and the associated software forming part of the operating software. The synchronisation and setting of this internal clock is implemented by the appropriate videotext information.

It is therefore necessary on starting up the device to select a transmitter with videotext, otherwise clock setting has to be carried out manually.

In standby operation the clock continues to run.

The following logic is provided for setting the time:

- On switching on using the mains button the clock is set to 0.
- On reception of a videotext transmitter the clock is set within one minute.
- In operation the clock is permanently synchronised with the videotext time, so long as time is running in the text.
- If the time deviates by ± 1 or 2 hours, it is only on selection of program locations 1, 2 or 3 that it is set to the videotext time, to avoid time zone errors.

Note

If during operation the time is corrected manually, synchronisation with videotext time is no longer implemented. The time is then running free and after a few days large deviations could occur. Synchronisation of the clock with the videotext can then only be implemented by re-setting the processor, i.e. after switching off and on the mains switch.

The system clock controls the recording of a connected videorecorder, i.e. the switch off and switch on time. For these functions it is important that the system clock is correctly set. If no transmission with videotext is re-

ceived, the time and date can be manually set.

Note:

The switch off timer can only be completely deactivated with "--:--". If "00:00" is set, then at 24.00 the device switches to standby.

4.2.9 Control of signal processing

The SDA 6000 microprocessor controls and monitors all signal processing. To do this it is linked to the signal processors via the I²C bus system. Each processor has an integrated I²C bus interface and a working memory. The content of the working memory is deleted on shut down. This means that the data required by the processors must be reloaded during the start up routine.

This data is stored ex-works in a non-volatile form in the memory IC of the EAROM 24C64. This tuning data is also already stored in replacement EAROM's and therefore only requires minor corrections if an IC is changed. The cost is about the same as current tuning costs after a change of chassis and can be implemented via the FB sensor. A computer can be used for tuning, as detailed in number of specialist magazines, but does not save any time.

On start up C 161 reads the tuning values from the memory via the I²C bus and enters them into the working memory of the appropriate processors via the I²C bus. Apart from the static data that the system requires for functioning, data for the picture amplitude, picture geometry, picture width, etc. is contained in this entered information. It also includes the customer specific tuning information such as brightness, colour saturation, volume, etc. The latter can be changed at any time by the customer, and by using the memory function the changed values can be entered into memory in a non-volatile form.

Changes to these values will be communicated via the I²C bus to the appropriate processors during the adjustment procedure and can then be adjusted to the required values. All data read in on start up as well as data changed by the customer during operation, is checked during operation by continuous communication between the SDA 6000 and the signal processors. If deviations occur these are corrected immediately.

This is particularly the case for time-dependent tuning values such as, for example, white value, black value and c.r.t. leakage current. For this reason in devices incorporating the Q 2500 chassis, ageing of, for example, the c.r.t. only becomes apparent when the scope of control is exhausted and the c.r.t. is totally worn out. In our chassis these dynamic tuning values are therefore subject to special treatment. The values for these functions held in the memory are automatically updated to the current values on each save procedure. In this way updating of the current wear-determined values on start up is not necessary, which the end user will surely notice.

For control and adjustment procedures via the remote control and local operating buttons the changes are initially made only in the working memories of the appropriate IC's and in the register of the SDA 6000. Normally the saving of values in EAROM must be implemented by an additional command (usually the OK button). If the remote control is used to switch the device to standby, then the data in the register of the SDA 6000 is available when the unit is restarted. The data within the unit, such as the last volume level set is retained.

When the unit is switched off at the mains the microprocessor register is deleted, and on the next start up only the EAROM data is available. So that specific settings are retained, the EAROM has an area for "Last memory" data. On shut down the data is saved to this area (e.g. last programme location). In addition, a few seconds after programme location change the set programme location is saved in the Last Memory data area.

4.2.10 Service mode

In order to carry out chassis tuning the device must be placed in the required service mode. The remote control can then be used to call up all the necessary functions for chassis tuning, with a few exceptions. After successful tuning the new values must be saved. The exact functions available in the service mode can be found in the service instructions for the appropriate device.

4.2.11 Video text

In the 100Hz TV set system the videotext function and the production of overwriting OSD is now the responsibility of the CCU SDA 6000.

For this reason the FBAS signal is fed to pin 117 of the CCU. The CCU controls full data separation and memory administration internally. The VT pages are then stored in the SDRAM I 2916.

The VT information as also the OSD overwriting are applied to pins 112/113/114 of the CCU as RGB signals.

4.2.12 Picture signal processing

Picture signal processing is implemented by highly integrated modern circuits that have been used for the first time by Loewe, in similar IC variants, in the Q 2300 chassis generation. The highly integrated IC's mean that for the two 100 Hz generation chassis Q 2100 and 2200, the 100 Hz module necessary for the signal board can be dispensed with. All the ICs necessary for signal generation can be fitted without problem on the component side of the signal board. This also provides much simpler faultfinding, which is also favoured by the clear signal flow.

The picture signal processing is mainly in digital form, with ICs from different manufacturers being used. The video processor VPC 3230 developed by Intermetall is used in the front end. A Philips IC set is used for the 100 Hz processing. This IC set was reduced by higher integration to two chips and the two half picture memories. The new SAA 4993 in the Q 2500 chassis is used for the latter. The microcontroller, the memory controller, the 50/100Hz memory and the DAC are all combined in the SAA 4979 (BESIC). In the back end of the Q 2500 chassis there is a new processor that contains both the video and the deflection function. The Philips TDA 9332 video/deflection processor has the item number I 2521.

In addition, the Q 2500 chassis can also be optionally equipped with picture in picture processing. This enables one or three small pictures to be inserted (see picture in picture). A split screen is also possible for the first time.

4.2.13 Components for signal processing

The following is a short overview of the components and their functions as used for signal processing. The signal path, pin-assignments and the exact functioning is explained later. The processing is also described in detail later.

- VPC 3230
Video processor
8-bit ADC for FBAS and Y/C signals
4-line comb filter
Multi standard colour decoder for PAL/NTSC and SECAM
20.25 MHz clock generator
Letterbox detector
Line compression and decompression for zoom modes

- 2 x MSM SAA 4955 HL
Half picture memory

The two half picture memories are necessary for the picture signal intermediate storage and processing.

- Philips SAA 4993

(Falconic: Field and line rate converter with noise reduction IC)

Dynamic noise suppression set by user.
Suppression of intermediate line flickering DLC (Digital Lineflicker Reduction).
Suppression of motion in horizontal movement, DMI (Digital Motion Interpolation).
Suppression of motion in movies, DMM (Digital Movie Mode).
Line interpolation, in order to display 576 lines in all zoom functions, DLI (Digital Line Interpolation).

- SAA 4979
(BESIC: Back End System control IC)
The integrated half picture memory is for 50/100Hz conversion.
Control of 100 Hz signal processing
Synchronisation of 32 MHz
Peaking and CTI (Colour Transient Improvement) to improve Y and chroma interfaces.
Horizontal sampling
DAC for Y, R-Y and B-Y
- TDA 9332
(Video/deflection processor)
Inputs for two separate RGB signals.
PAL/SECAM and NTSC matrix for production of RGB signals.
Colour saturation, brightness and contrast settings.
Automatic Cut Off and leakage current control and setting.
Beam current limitation circuit.
RGB output amplifier.
Production of V/H deflection control signals

4.2.14 Signal path

All FBAS or Y/C signals delivered by the receiving units, the three Euro/AV sockets of the front interface, are directed via the video matrix switch to the video processor VPC 3230. The FBAS or Y signal is led from pin 17 of I 1711, via the impedance converter Q 1814 to pin 73 of the video processor I 2271. The filter in the Y/FBAS path consisting of L 2259/57 and the associated capacitors has low pass characteristics. Frequency components over 7 MHz are efficiently suppressed by the filter. This prevents floating effects in the video signal, that may arise from the cycle rate of the ADC and residual signals from neighbouring channel. For Y/C operation the chroma signal moves from pin 14 of I 1721, via the emitter follower of Q 1824 to filter L/C 2266, which suppresses noise components, and then to chroma input pin 72 of 2271.

VPC 3230 is also equipped with two RGB input interfaces.

Pins 1-3 of I 2271 are connected directly to the Euro/AV socket 2 via the corresponding input filter. The associated fast-blank signal is applied to I 2271 on pin 79.

Q 2226 prevents the FB voltage exceeding 2.2 V and thereby damaging the videoprocessor. RGB operation via the Euro/Avc socket 2 is therefore also fast blank compatible. Y/U/V operation is also possible from the second RGB input from pin 4 of I 2271 , 5 and 6. The RGB signals are fed from the optimum DVB module or from the Euro/A socket 3 via this input. The same goes for the Y/U/V signals of the Euro/AV socket 3. The inputs 4, 5 and 6 from I 2271 are not fast blank compatible.

The video processor VPC 3230 digitises and fully processes the FBAS analogue input sig-

nals or Y/C signal. On the output there is a digital 8-bit wide luminance and an 8-bit wide demodulated chroma signal with its U/V components. The luminance and chroma signals are transferred in multiplex procedures via eight LM0-7 lines. The amplitude on the lines is 3.3 Vss. The associated cycle frequency is 27 MHz and is output from pin 27 on I 2271.

In SAA 4979 the luminance and chroma signals are led to a demultiplexer and read into the internal half picture memory. Selection results with the 100 Hz cycle rate of 32 MHz.

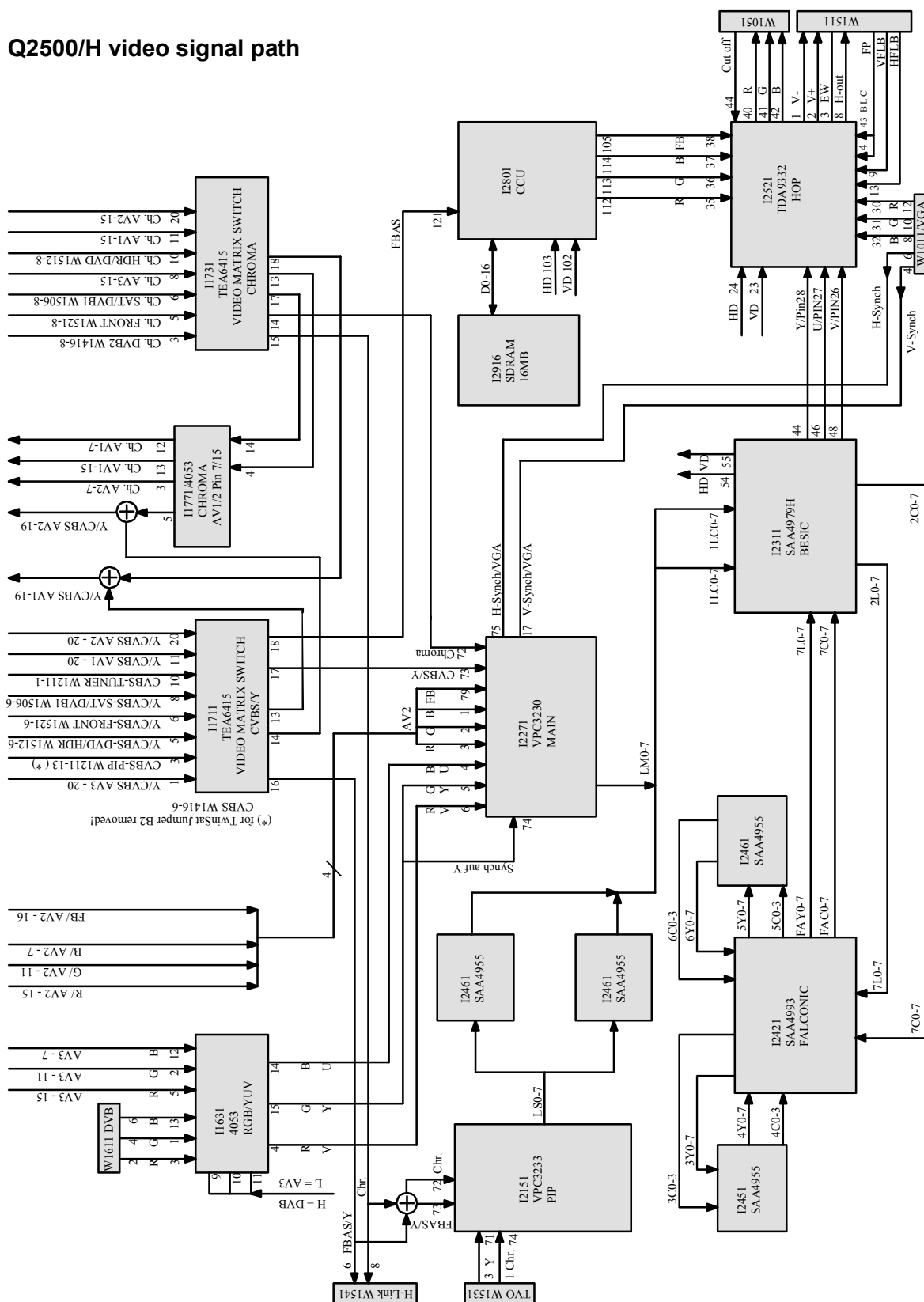
With 3 Mbit, slightly more than a half picture can be stored in intermediate memory, which permits continuous single and dual selection. The next IC in the signal path, SAA 4993, is responsible for noise suppression and various interpolations. Noise suppression is implemented by signal from the output, which has already been processed, being delayed for a half picture by the second half picture memory and then mixed with the currently applied signal.

In addition, this IC suppresses the intermediate line shimmer. Line interpolation also occurs, so that 576 lines can be displayed in all zoom functions. Movements between the pictures are also interpolated, to ensure a continuous movement process over all half pictures.

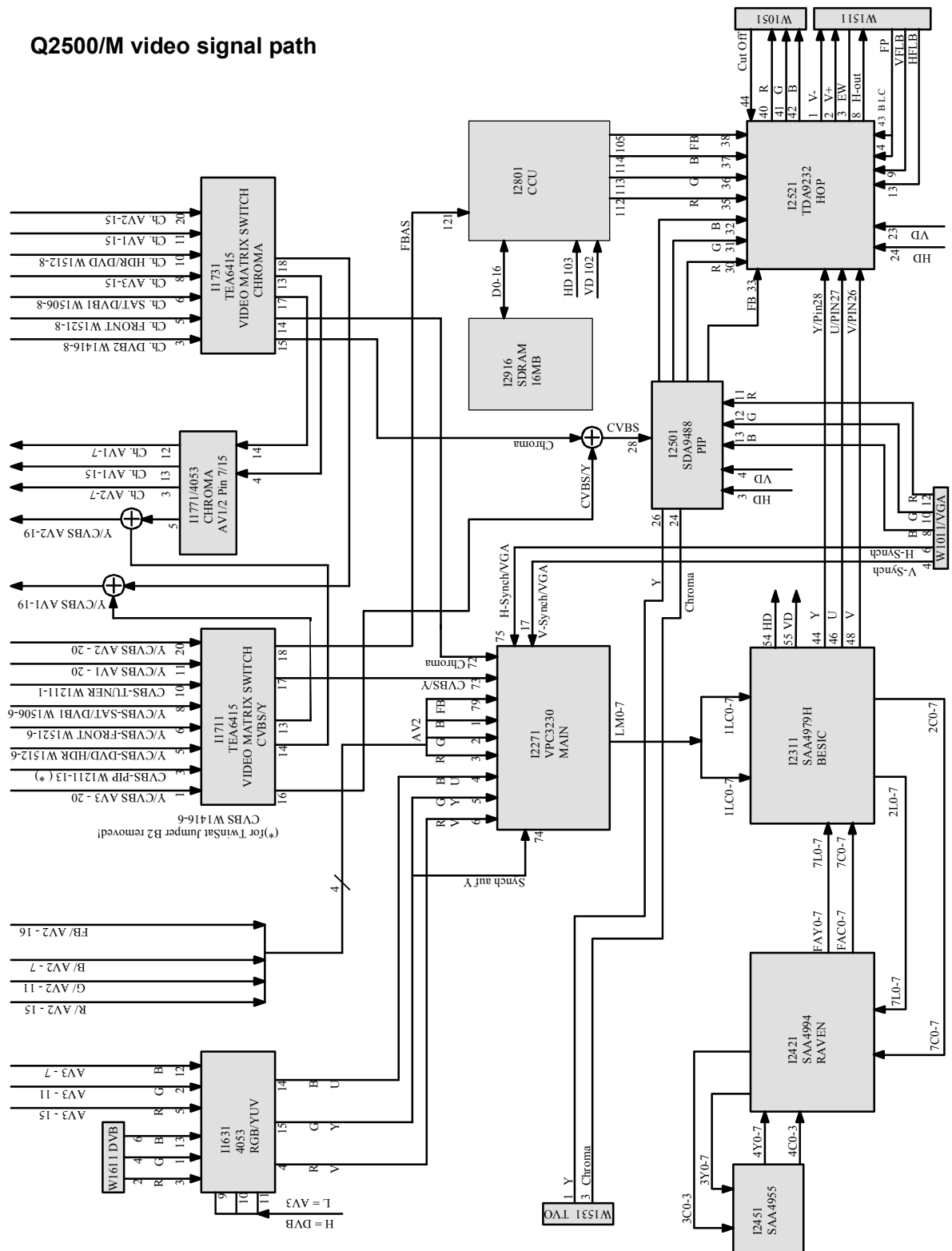
SAA 4979, which is the next IC in the signal path, is used mainly as a DAC and for the control of the digital 100 Hz video processing in the circuit.

In the chroma branch there is a circuit for improving colour transitions. It is used to increase the slope of the colour transition flanks in the differentiation and adder stages.

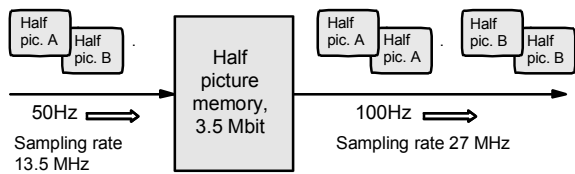
Q2500/H video signal path



Q2500/M video signal path



100 Hz principle



In the Y signal path there is a peaking circuit. It is used to produce black/white edges on overshoots, which increases the sharpness of the picture. The height of the overshoot can be adjusted with the "Sharpness" operating function.

With three output side DACs analogue Y-, R-Y- and B-Y- signals are produced, which are then output on pins 44, 46 and 48.

Finally the Y- and colour difference signals are fed through low-pass filters to filter out interference pulses and the residue of digitisation.

The last IC is the TDA 9332 for the 100 Hz colour signal processing. It controls the RGB power output stages to the c.r.t plate.

The Y-, R-Y- and B-Y signals output on pins 26, 27 and 28 produce RGB signals using analogue matrix circuits.

The IC carries out further processing of analogue RGB signals (twice), CCU signals (once) and signals from the optional VGA interface or online module. Depending on the associated blank information, both the internally produced and the two RGB signals from a selection circuit are switched.

The following integrated modules are responsible for colour saturation, brightness and contrast setting. Control is via the I²C bus from the CCU. The same is true for the white and black value setting. An automatic black value setting is also available. With this cutoff control, signs of ageing, e.g. the c.r.t, are corrected (see description of the RGB output stages).

The signals reach pins 40, 41 and 42 via the RGB output amplifier and are held there at 4 V_{ss} for control of the speed modulator and the RGB output stages.

4.2.15 IC functions

The following paragraphs give a more detailed description of the functions of the ICs used for picture processing.

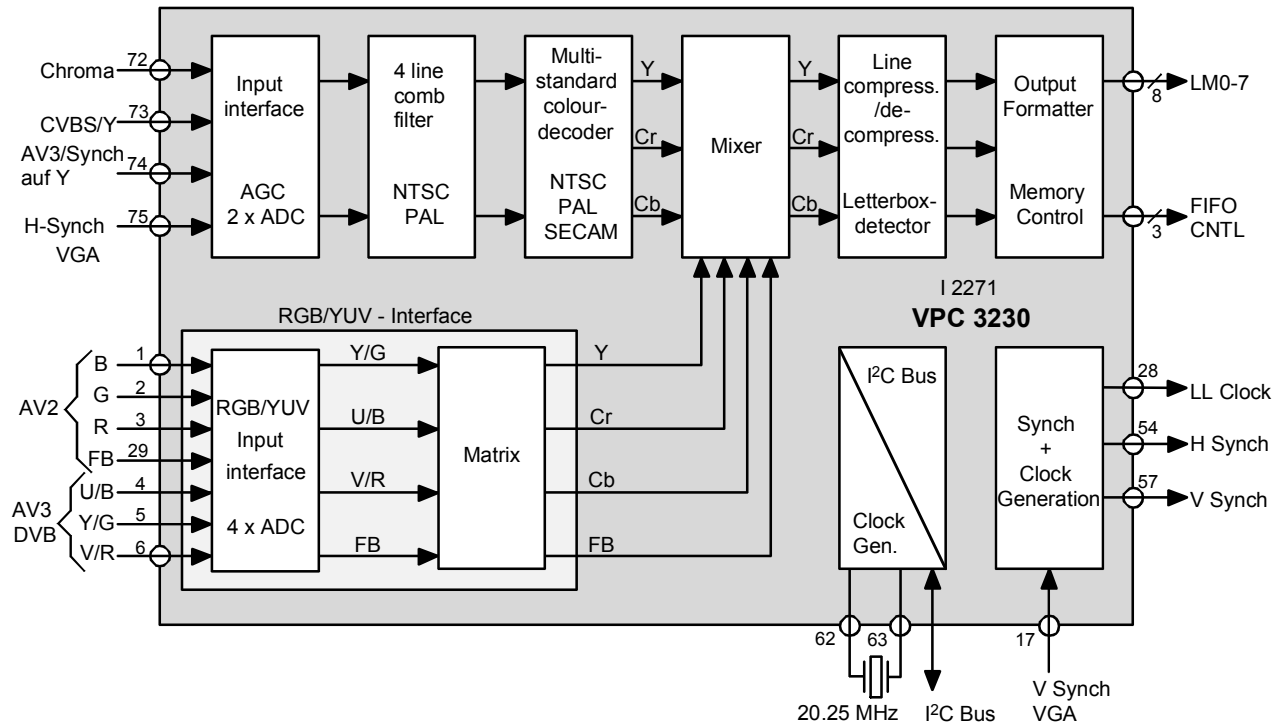
In the descriptions, the processes are shown in a much-simplified form. The operations necessary for the execution of the functions are inevitably much more complex.

4.3 VPC 3230

Video processor

The VPC 3230 is a recently developed video processor from Intermetall in 0.8 μ CMOS-technology. The functions are contained in an 80 pin PLCC housing.

VPC 3230 block diagram



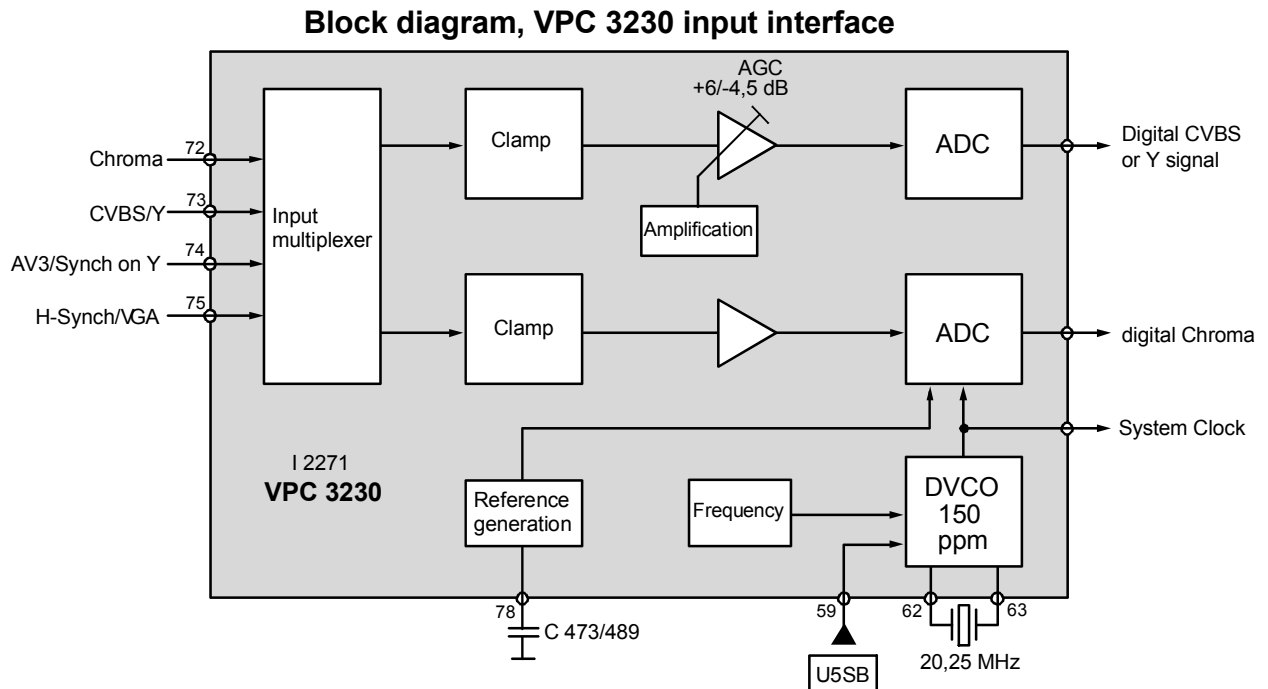
The functions in the VPC 3230 can be roughly summarised into 9 blocks:

- Input interface with signal selection and two precision 8 bit A/D converters
- 20.25 MHz clock generator
- high quality, adaptive 4 line comb filter
- Multistandard colour decoder for PAL, NTSC and SECAM
- Letterbox detector
- Output format conversion (Output formatter)
- I²C bus interface
- Synchronisation block
- RGB/YUV interface

4.3.1 Input interface

On signal board Q 2500, the input multiplexer is switched in such a way that a choice can be made between two pairs of signals. If an FBAS signal, for example, is supplied by a receiver unit or a Y/C signal is fed to an interface, pin 73 for the FBAS/Y signal and pin 72 for the chroma signal are switched.

So that the signals from the ADC can be correctly digitised, two conditions must be fulfilled. The d.c. level and the amplitude of the signals must be adapted to the ADC. The d.c. level is defined by a signal clamp. For this there is a clamp circuit in the FBAS/Y path that clamps the signal to the rear black shoulder.



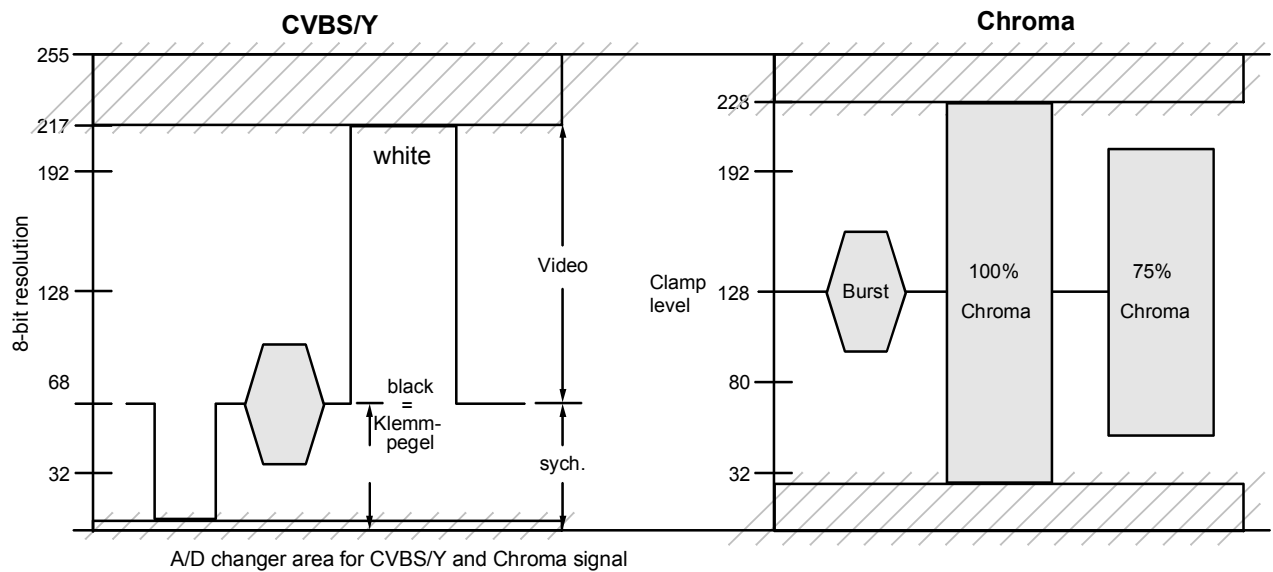
The chroma signal is clamped to its middle value. The following automatic amplifier control in the FBAS/Y path has a control range of -4.5 dB to +6 dB and ensures that even for different input levels the FBAS/Y signal is always optimally adapted to the ADC. In the chroma branch a fixed amplification is sufficient.

The FBAS/Y signal, as also the chroma signal for Y/C operation are digitised at a cycle rate of 20.25 MHz. The resolution of the two ADCs is 8-bit. Therefore, at the output of the input interface there is an 8-bit wide FBAS or Y data stream and for Y/C operation also an 8 bit wide chroma data stream. Both ADCs need a corresponding reference value. This is pro-

duced internally in the reference generation and stored externally on pin 78 by C 488/489.

4.3.2 20.25 MHz clock generator

The frequency determining 20.25 MHz Quarz X 2283 is connected to pin 62/63 of VPC 3230. The clock generator is controlled from the synchronisation block. In normal operation the clock generator is line frequency coupled. In the VCR mode, the line frequency coupling is switched off.



4.3.3 Comb filter

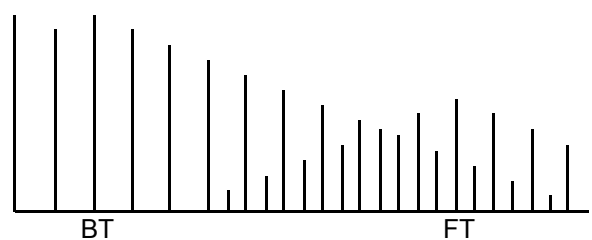
In this area of VPC the normally unavoidable Cross Colour and Cross Luminance interferences in the PAL system are eliminated.

In addition, the use of a comb filter even for colour transmissions permits the full 5 MHz Y resolution to be achieved. Without a comb filter it would be limited to approx. 3.8 MHz by the chroma trap, which would otherwise be required.

This function can be switched off, as it is the case that for all receiver-side circuits for picture improvement, even using a comb filter, there are some rare picture presentations which are not good. Switching off is implemented automatically via the analysis circuit. As this has error-free functioning, the user does not need to worry about switching off.

• Function of a comb filter

Let us consider the transfer method of the PAL signal. The brightness information determines that the full video bandwidth is not occupied for all frequencies, but only in specific areas. The colour information is inserted into these energy gaps.

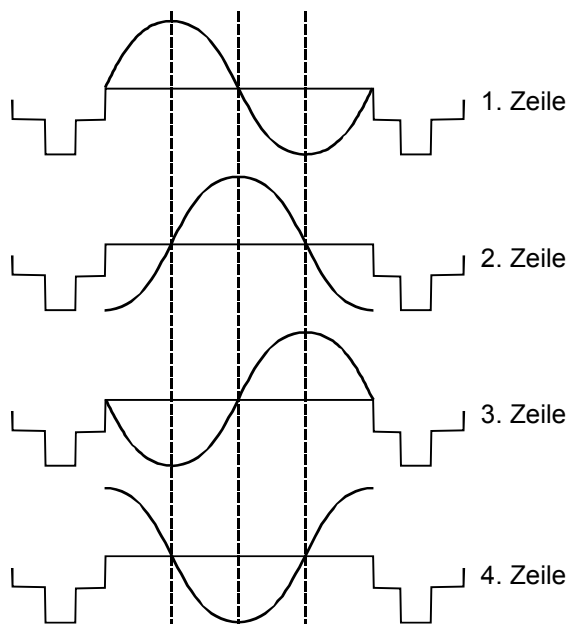


If the colour carrier is in one of these energy gaps, then all sideband frequencies are in the gap as well. For this the picture and colour carrier frequencies must be firmly coupled. The product of these two frequencies is an overlapping frequency. The sine waves cause light and dark pixels on the screen, which have a fixed position from line to line, so that on the screen these form a vertically placed light-dark pattern. The higher the colour car-

rier frequency the less pronounced the Moiré becomes.

In order to keep interference with the picture as low as possible, the phase position of the colour carrier frequency from line to line is shifted forward by 90° . In this way, bright and dark pixels only overlap after four lines. At normal distances the eye cannot detect this interference.

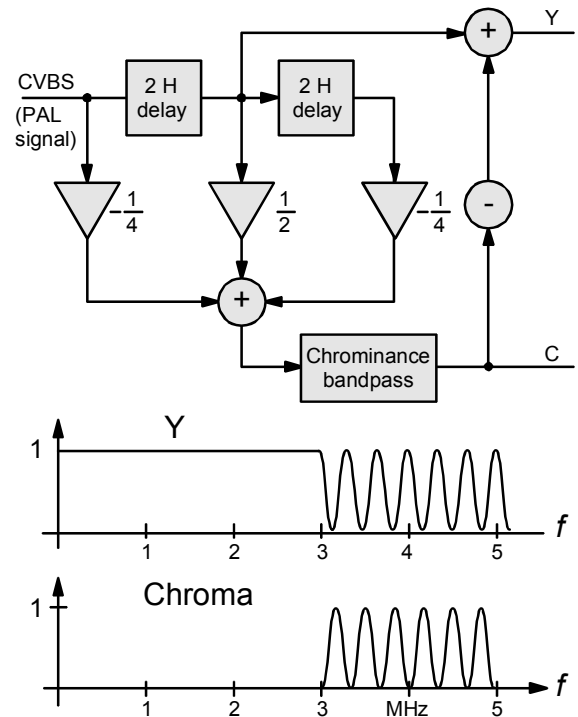
This compensation is known as "Fourth Line Offset Procedure".



This fourth line offset now permits the filtering out of colour components from brightness information, and the reverse. The phase shift from line to line causes a counter phasing of the colour carrier every two lines.

If a two-line delay line is inserted into the circuit and the direct and delayed signals are added together, the colour information is removed and the brightness information is present on the output at double the amplitude.

If one subtracts the two signals from one another, the brightness information is eliminated and the colour information is present at double the amplitude on the output of the circuit.



Theoretically this circuit supplies error free results. A condition for this, however, is the phase and amplitude equality of the chroma signal over 3 lines, which is only the case for the same and equally saturated colours. In practical terms picture joining can occur, in which cross colour and cross luminance interference cannot be removed by the comb filter. Therefore, another circuit is integrated, in which three lines in sequence, from the point of view of both phase and amplitude, are compared.

If a deviation is detected that goes beyond a specific difference, the comb filter function is automatically switched off and the separation of the two components is implemented traditionally with chroma trap and band pass.

As VPC 3230 requires four lines to determine whether the comb filter is to be switched off, the filter operates more efficiently and more frequently than for a two line comb filter.

The vertical correction of the signal is achieved by the line interpolation in SAA 4991.

4.3.4 Multi-standard colour decoder

This block executes demodulation for all TV standards - PAL, NTSC and SECAM. Additional external components are no longer required. On the output of the colour decoder there is an 8 bit wide luminance and chrominance signal respectively in 4:2:2 format.

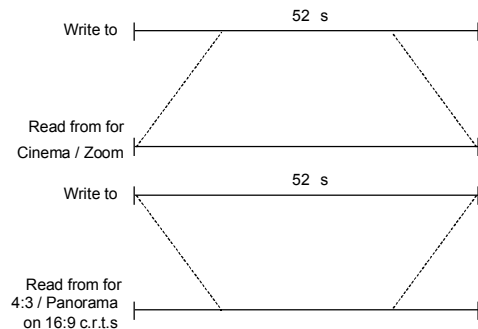
The VPC monitors the Auto S-VHS detection by means of the colour decoder for the separate chroma line of the colour burst. If signals are fed in from a VHS video recorder, then no burst is present on a separate chroma line. This is in turn communicated to the CCU. The CCU switches to VHS operation. If an S-VHS recorder is connected then a colour burst is measured on the chroma line on playback and the CCU switches the VPC to S-VHS operation via the I²C bus.

4.3.5 Line compression and decompression

To reproduce 4:3 pictures on a 16:9 c.r.t., and also for the various zoom modes, the video signal must be lengthened, or stretched, horizontally. For this the VPC 3230 has a line memory. Selection occurs at a slower speed, with the line beginning and end not being read (zoom, cinema)

However, quicker selection is also possible. For this the start is delayed with respect to the deflection and the selection is ended before the line end of the deflection (4:3 and Panorama for the 16:9 c.r.t.).

Line compression/decompression

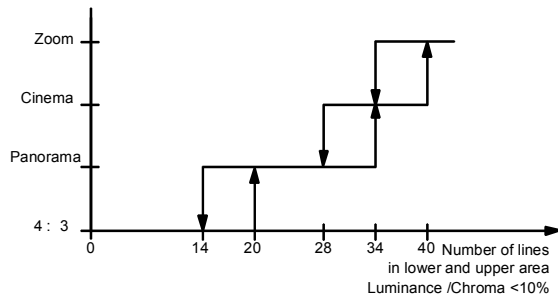


Letterbox detector

For Cinemascope or other film standards upper and lower black bars of various thickness are visible. These black bands can be removed by various zoom functions or at least reduced. Devices with 16:9 c.r.t.'s are also fitted with an automatic format conversion. Depending on the thickness of the black bars this automatic movie detection - AMD - switches between three different zoom modes. For this the Letterbox detector measures the luminance and chrominance components in the upper and lower area.

If, within defined lines, luminance and chrominance values of less than 10% are measured, the CCU switches the deflection controller and the display processor to the appropriate geometrical format. As programme logos are often placed on the right and left of the black bars, no measurement takes place in this area.

Automatic format conversion for 16:9 devices.



As 4:3 picture presentation with upper and lower black areas can lead to false results, the analysis occurs 4 sec. before switching occurs. If, however, undesired conversion processes occur, the function can be switched off with the remote control.

4.3.6 Output format conversion

Up to now luminance and chroma signals have been processed IC internally at a cycle rate of 20.25 MHz. For additional processing by the 100 Hz Philips IC set, an output cycle rate of 13.5 MHz is required. In the Output Formatter, therefore, the output data is converted from 20.25 MHz to 13.5 MHz. The YUV output format is also converted at this stage to 4:2:2 and output by a multiplex procedure to 8 lines. The multiplex cycle rate must therefore have the double cycle rate of 13.5 MHz. The multiple cycle rate on pin 27 of I 2271/ therefore has a frequency of 27 MHz.

4.3.7 Synchronisation block

The synchronisation block generates all the synchronous, sampling, cycle and clamp signals that are necessary for internal and external signal processing.

Before the digital video signal reaches the horizontal and vertical synchronous separation stage, it passes through a 1 MHz low-pass. With the low-pass, video and noise components >1 MHz are suppressed. All signals that are required for the various process-

ing steps in the VPC are controlled via an internal PLL stage and counter.

No special synchronous signals are used for other external signal processing. The SAA4979 detects picture and line start from the data delivered by the VPC, and for further signal processing produces independent V/H synchronous signals. The VPC 3230 supplies the 27 MHz multiplex cycle to pin 27 for the digital luminance/chroma signals.

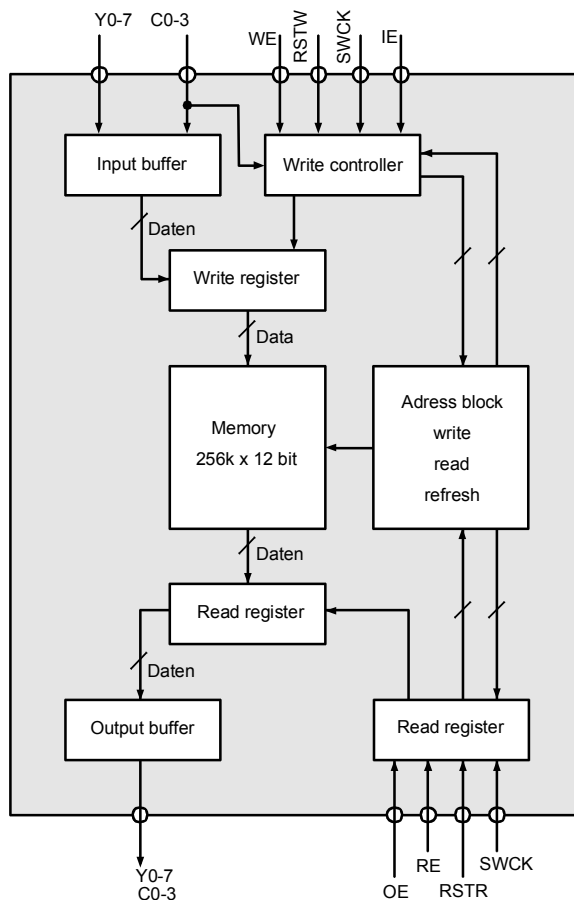
4.3.8 I²C bus interface

Communication between C 161 and VPCm is via the I²C bus interface. The register in the VPC is loaded via this interface after start up and the status in operation is selected via it.

4.4 Half picture memory SAA4955HL

The two memory IC's and the memory integrated into the SAA 4979 are functionally identical, their tasks, however, are different.

SAA4955HL block diagram



The picture memory in SAA 4979 is for the actual 100 Hz function in the circuit, whereas picture memories 2 and 3 I 2451/ I 2461 facilitate noise suppression, the suppression of line quivering, interpolation and a full line freeze frame by a delay of 1 half picture.

Data writing and reading for the two memories take place completely independently of each other.

Inputting and outputting for a single memory is also separately controlled. Data is therefore written to one area of the memory, whilst it is read from another area.

4.4.1 Storage space

The IC is organised into in 256 k words each of 12 bit. Two independent clock signals for writing and reading allow these functions to be carried out concurrently and independently.

A total of 3 072 000 bits can be stored, which corresponds to a little more than one half picture.

This comprises the following:

Sampling rate 16 MHz at a line frequency of 15.625 kHz

$$\frac{16 \text{ MHz}}{15.625 \text{ kHz}} = 1024 \text{ sampling values per line}$$

As the synchronous pulse and the front and rear black shoulder are not required, there are 832 sampling values per line for the actual picture signal. A sample value corresponds to one displayed pixel on the screen.

The sampling gap is not required in the vertical direction either. There are therefore 290 lines per half picture.

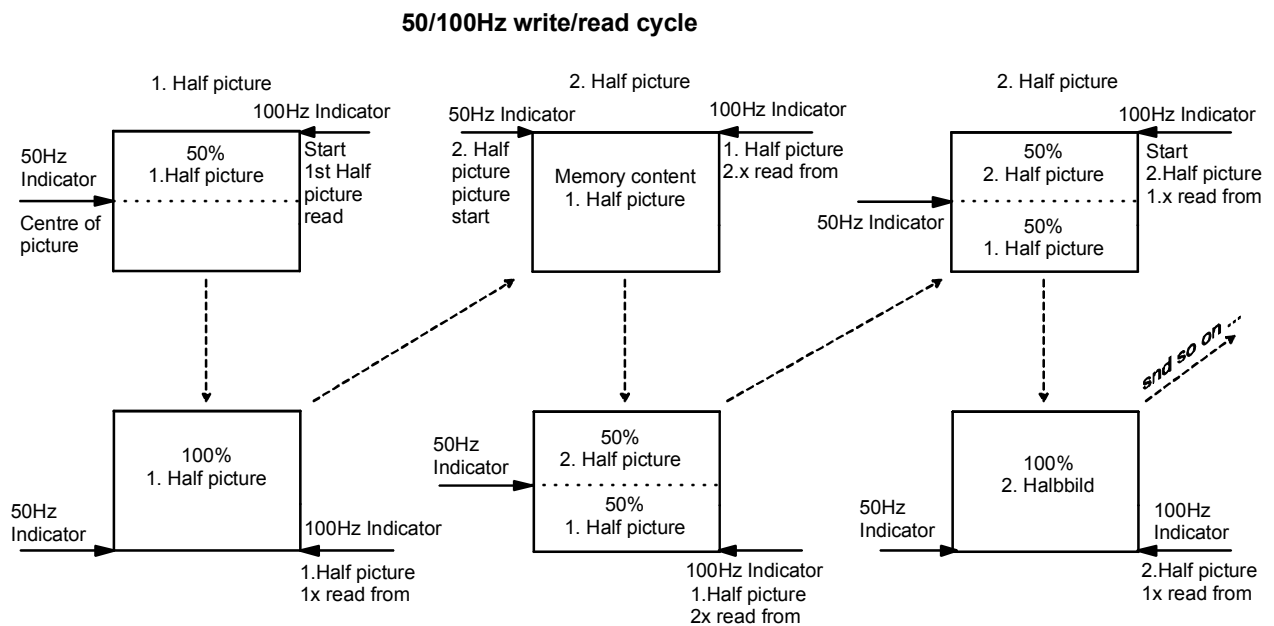
$$832 \text{ pixels} \times 290 \text{ lines} = 241\,280 \text{ pixels}$$

Therefore for each half picture 241 280 pixels must be stored. At a resolution of 8 bit Y and 4 bit chroma

$$241,280 \text{ pixels} \times 12 \text{ bit} = 2,895,360 \text{ bit}$$

are required for half picture storage capacity.

The 3 Mbit is sufficient for the separate, continual inputting and outputting of this function.



4.4.2 Conversion of signals in 100 Hz in memory 1

Frequency doubling takes place in the half picture memory 1 (in I 2311), as it is read at double speed. This means it is possible to read the memory twice, whilst it is only written to once. The first reading of a half picture always starts when a little over half the picture is in memory. Due to the double speed, writing to and reading out end at about the same time. As the return times at 100 Hz are also twice as fast, reading out starts before writing to. The picture is therefore read out for the second time and during this time up to half of the next half picture is written to memory.

4.4.3 Half picture memory 2 and 3

In this half picture writing to and reading out of memory take place at the same speed. The half picture is read to memory a second time and so delayed by a half picture. This means that half picture A can be written to and read from memory, whilst the same is happening in memory 1 for half picture B.

4.4.4 Control pulses

The memory is controlled by the following pulses:

pin 22: SWCK (Serial Write Clock)

Cycle for reading in the Y/C signals to the memory.

pin 23: RSTW (Reset Write)

The address counter for writing at the start of the memory area is set at H level.

pin 24: WE (Write Enable)

So long as H level is present, the address counter continues counting to write with WCK.

pin 25: IE (Input Enable)

Data inputs for Y/C signals are released at H level.

pin 30: OE (Output Enable)

Data outputs for Y/C signals are released at H level.

pin 21: RE (Read Enable)

So long as H level is present, the address counter continues counting to read with RCK.

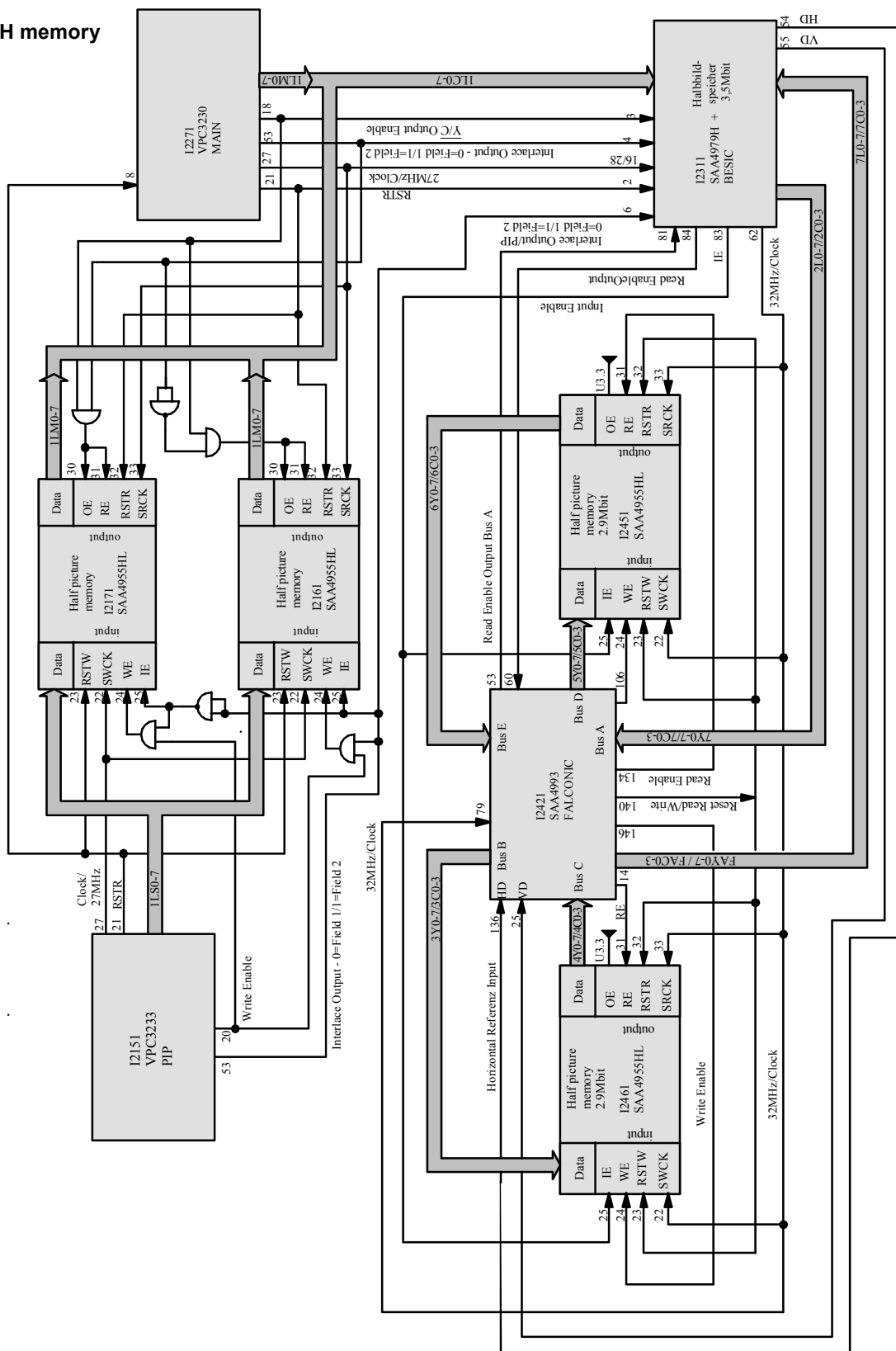
pin 32: RSTR (Reset Read)

H level sets the address counter to read at the start of the memory area.

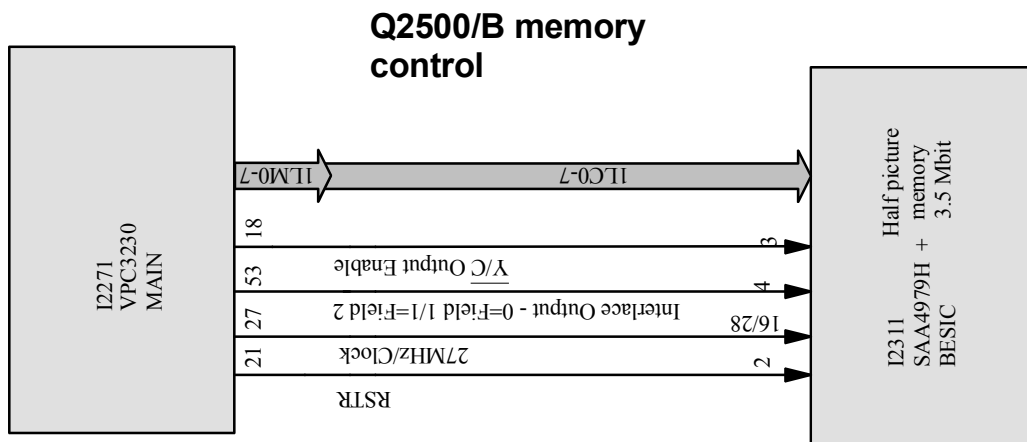
pin 33: RCK (Read Clock)

Cycle for reading the Y/C signals from the memory.

Q2500/H memory control







4.5 Falconic module SAA 4993

With the conversion of a picture signal to a line coupled sampling and level adaptation at 3.3 V, 100 Hz is achievable with a 3 Mbit picture memory and a memory controller

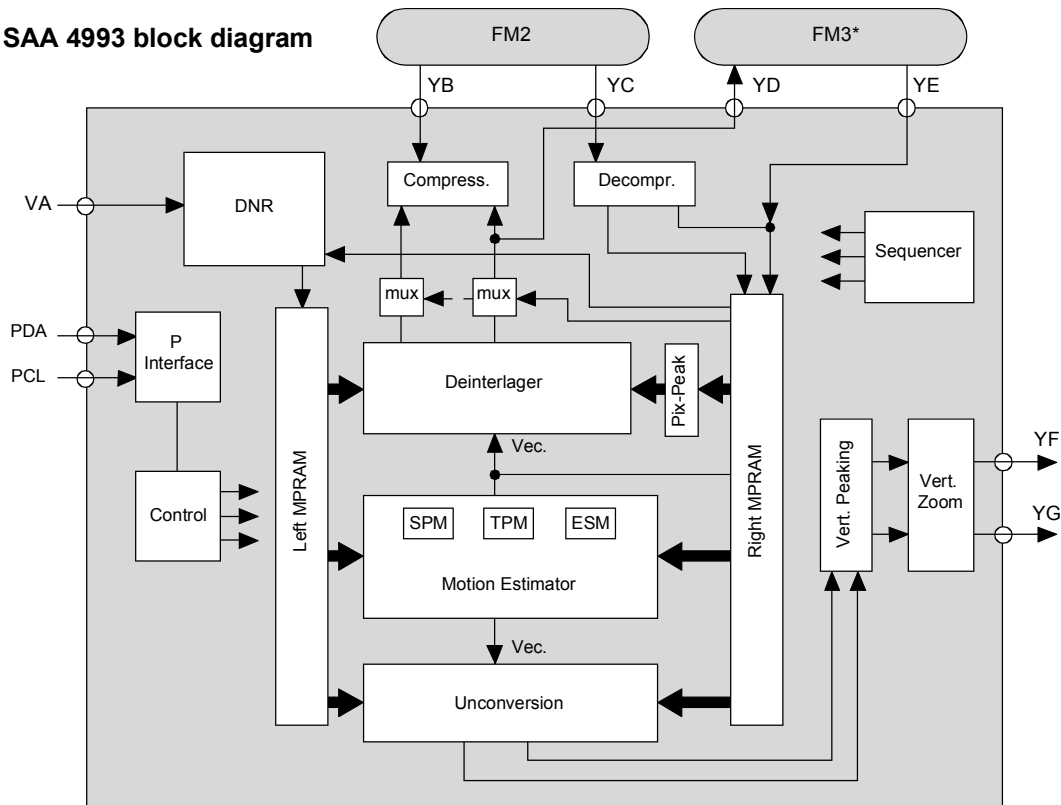
As doubling of the picture change frequency, depending on picture quality and picture presentation, can lead to undesired side effects, a number other features are provided on the Q 2500 chassis. This means that the side effects can be compensated for.

4.5.1 Noise reduction

Together with a second picture memory, SAA 4993 is able to eliminate some of the picture noise that occurs owing to an inadequate antenna signal.

Internally the IC has two separate signal paths, one for the Y and one for the chroma signals. Functionally they are both identical. In the chroma path is a demultiplexer on the input and a multiplexer before the output.

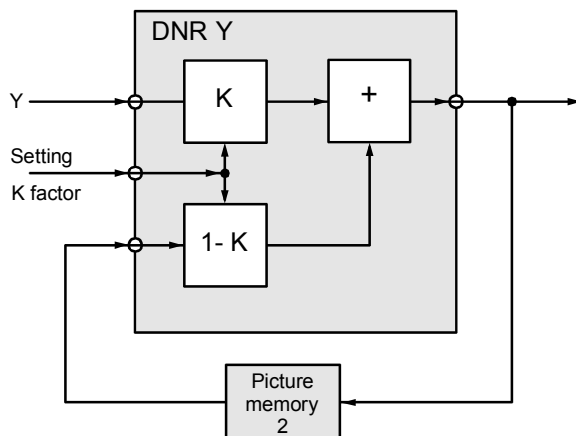
SAA 4993 block diagram



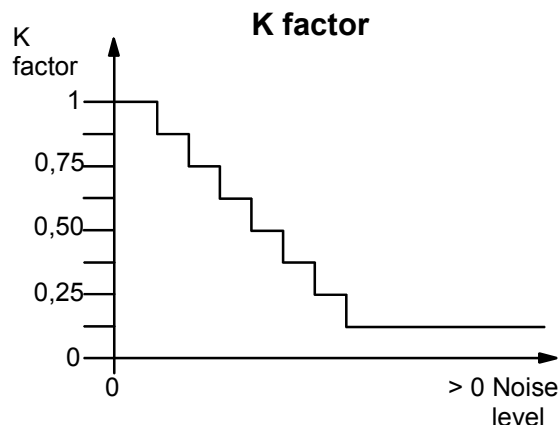
* (SAA 4994 does not control FM3)

Simply expressed the noise suppression system consists of the current half picture signal, in which components of the previous signal are mixed. The composition of the output signal, that is the number of components of the direct and the number of components of the delayed half picture, are determined by the so-called K factor. This K factor is determined by integrated automation.

Principle noise suppression



When using the automation the K factor is dependent on the movement between the half pictures. If there is a lot of movement, noise suppression is not very effective.



Information about the size of movement is provided by the movement detection. This occurs only in the Y branch, with which the K factor is set simultaneously for chroma and Y.

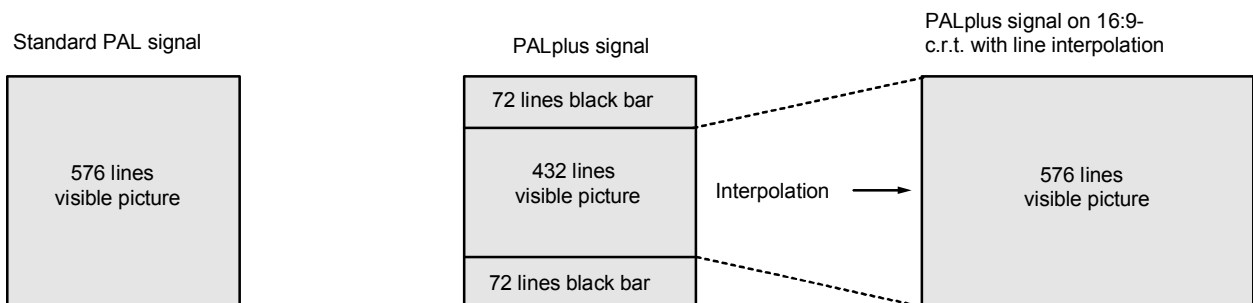
The drawing shows the DNR principle for the Y path. As already mentioned the circuit in the chroma path is identical. The K factor can have a value from 0 to 1. At $K = 1$, 100% of the direct signal and 0% of the delayed signal is switched to the following "And". No noise suppression is therefore available.

In the other extreme case $K = 0$, only the delayed signal would be switched, which would correspond to a freeze frame. To avoid this the K factor in our TV sets can never be 0.

Otherwise it would only be programmes with a weak signal that would be incapable of being displayed.

4.5.2 Line interpolation

The line interpolations circuits allow a situation to be achieved in which a full-line picture is written for PALplus signals. The advantage with respect to a PALplus decoder is that even without a PALplus signal, the interpolation in all zoom modes delivers a full-line picture. This function is explained in the following paragraphs for PALplus, in the zoom functions the circuit operates similarly only with other factors.



A standard PAL signal consists of 576 visible lines. For PALplus, 144 of the lines are dark sampled and only 432 lines are transferred as a visible picture. In 16:9 c.r.t.'s these signals are shown in the ZOOM mode. In order to display 576 lines the information for 4 lines must be determined by 3 lines respectively. This computer operation is very

complicated and will therefore not be explained here.

Line interpolation must be carried out both in chroma as in the Y branch.

4.5.3 Movement detector

In the Y branch there is a movement detector. Here current and previous half pictures are compared with each other. An assessment is made of whether it is a question of full pictures in Cinema Scope format. The CCU receives this information via the microprocessor for the Automatic Movie Detection (AMD). The movement detector is also responsible for the setting of the noise suppression K factor.

In addition, using the movement from the previous to the current half picture an assessment is made of how the movement between the two half pictures could behave. In this way, in the movement compensation stage immediately following a new half picture can be calculated. At the same time it must be taken into account that the two half pictures, contain the intermediate lines for the other half picture respectively. In this way a continuous process of movement over all half pictures is achieved, both for horizontal as well as vertical movements. The DMI (Digital Moving Interpolation) function is active for both full picture presentation and for standard video signals.

The operation of this switch is largely error free. Nevertheless, under unfavourable conditions negative effects can occur, therefore the DMI function can be switched off. Instead, the DLC (Digital Lineflicker Control) function is switched on.

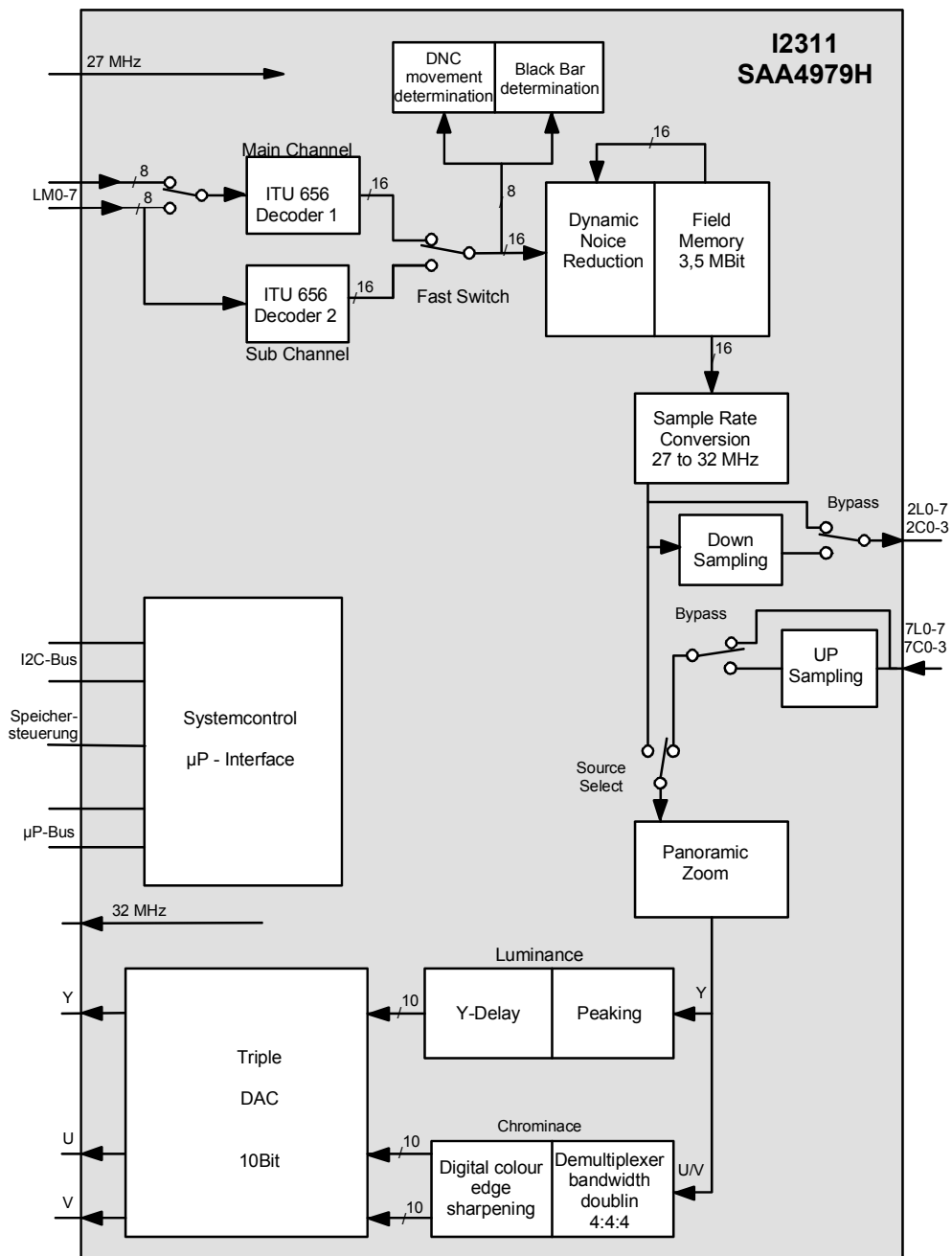
4.5.4 Memory control

Control of the SAA 4993 is implemented via the μ P interface from I 2311. The μ P bus is assigned to pins 26 (DA) and 27 (CI). In addition it is here in conjunction with the Memory Controller that writing to the 2nd picture memory and reading from the two memories is determined.

4.6 SAA 4979 (BESIC)

The next IC in the signal path, the SAA 4974, is designed for the following functions.

- Demultiplexer for luminance/chroma separation
- 3.5Mbit memory for 50/100Hz conversion
- Cycle rate converter from 27MHz to 32MHz
- Two signal paths for the separate processing of the Y and chroma signals
- Demultiplexer for the chroma signals
- Band width doubling and digital CTI circuit for improved colour transfer
- Peaking circuit Y branch to increase picture sharpness
- Three blank stages for dark sampling
- Three 10 bit DACs for the generation of analogue R-Y-, B-Y- and Y-signals, I²C bus interface and timing control for the control of the individual processes through the microprocessor.
- Microprocessor bus for the control of the SAA 4993.
- Control of write and read processes in the half picture memory, as well as the total digital 100 Hz video signal processing.
- Generation of a 32 MHz cycle.
- Generation of H and V synchronous pulses for the TDA9332 video/deflection processor.



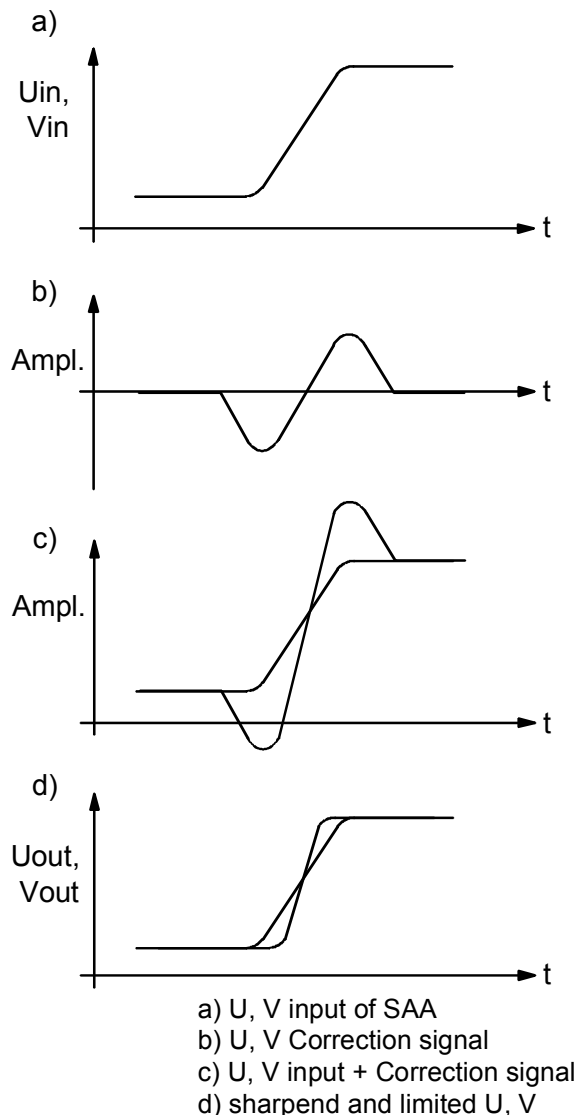
quency spectrum used for the brightness information.

4.6.1 Chroma branch

In the design of the colour television transmission the compatibility with normal black/white systems must be observed, in order for colour transmissions to be received by black and white sets. For this reason the colour information must be integrated into the available fre-

Secondly, to prevent interference the bandwidth for the colour signal must be kept as narrow as possible. For this reason a bandwidth of only 1.2 MHz was selected and the carrier frequency set at 4.43 MHz.

Owing to the narrow bandwidth the rise times for colour change are very long, which appears on the screen as "washed out" transitions.



To compensate for this deficiency, two circuit components are incorporated into the SAA 4979, with which short rise times can be achieved artificially, thereby improving the colour transitions.

In the circuit before these components is a demultiplexer, with which 8-bit wide parallel R-Y- and B-Y signals respectively are derived from the supplied signals.

4.6.2 Band width doubling

In order to increase the effectiveness of the colour flank increase on the supply side, a doubling of the bandwidth from 4:1:1 to 4:2:2 is implemented.

Using a linear phase interpolation filter additional sampling values are calculated from the available chroma sampling values.

These calculated sampling values are inserted respectively between two available values, by which means the bandwidth is doubled. In this way, steep flanks can be transmitted more easily.

4.6.3 Colour flank sharpening

An improvement of the colour transition is achieved by a dual differentiation of the original chroma signal and the ensuing subtraction of the derived correction signal of the chroma signal.

The changes in these signals are evaluated in separate circuits for U and V, and if a threshold value specified by the software is exceeded a correction value is calculated. After the two derived correction signals have been cleaned of noise components, they are subtracted from the available chroma signals U and V. The subtraction is implemented by inversion of the correction signals and subsequent addition with the original signal.

To avoid colour phase errors by the overshooter, it must be blocked by limiter stages.

Here analogue signals are produced from the respective 8-bit wide digital R-Y and B-Y signals, which are then output at 1.8 Vss on pins 46 and 48.

4.6.4 Y signal path

The peaking circuit is not used. The signal is led directly to the sampling stage. This operates in the same way as the sampling stage in the chroma branch.

Via the sampling circuit, the digital Y signal, which is now 9-bits wide, reaches a DAC, which generates an analogue signal. This is then output on pin 44 at 1.5 Vss.

4.6.5 Microprocessor interface

All processes in the SAA 4979 are controlled by SDA6000 via the I²C bus 0 (pin 1 = SDA, pin 2 = SCL). In addition, information for the SAA 4993 and the memory control is also transferred.

The SAA 4993 is controlled by the BESIC via the microprocessor bus to pins 108 (μ P DA) and 107 (μ P CL).

Switching outputs 4 are used for the switching of the VGA synchronisation. If a switch is made to the VGA programme location, then pin 4 is switched from I 2311 to L level. With this logic state the vertical synchronous pulse of the VGA interface W 1011 pin 4 is switched directly to the video/deflector controller I 2521 via the four Nand gates I 2361 A/B/C and D. The VGA synchronous pulse is, in addition, monitored by I 2271 on its pin 17. If no synchronisation or false synchronisation is detected, I 2311 resets its output on pin 4 and thereby switches over to internal V synchronisation.

4.6.6 Control of the 100 Hz processing (Display)

This stage synchronises the read out from the half pictures and the writing to memory in the second memory. As the signals in the SAA 4993 are written to and read out, it has direct control and is only synchronised by the BESIC.

Via pulse RE (pin 84) the Falconic module controls the reading from both half picture memories and the writing to the second memory.

With pulse IE (pin 83) SAA 4979 controls the data inputs in the second half picture memory. With L level a switch can be made to freeze frame, for example.

Furthermore, the display stage gives a horizontal pulse on pin 54 and a vertical synchronous pulse on pin 55 for the synchronisation of the deflection in TDA9332. At the same time, the vertical pulse VD acts as a reset for the Falconic and the half picture memories, for resetting the address counter on reading from the memory and for writing to the second memory.

4.7 Video/deflection processor TDA 9332/Range Video/RGB path

The last IC for picture signal processing, apart from the RGB output stages, is the TDA 9332. It also controls the deflection stage.

Inputs for analogue R-Y, B-Y and Y signals:

- Two RGB inputs for analogue signals from the CCU and the VGA interface and/or picture in picture generation
- Matrix circuits for RGB generation from the difference signals
- Signal selection for the switching of the required RGB signals
- Y and colour difference matrix for the generation of Y and difference signals from the selected RGB signal
- Hue control for NTSC operation and gamma correction in the Y branch
- Saturation, contrast and brightness setting

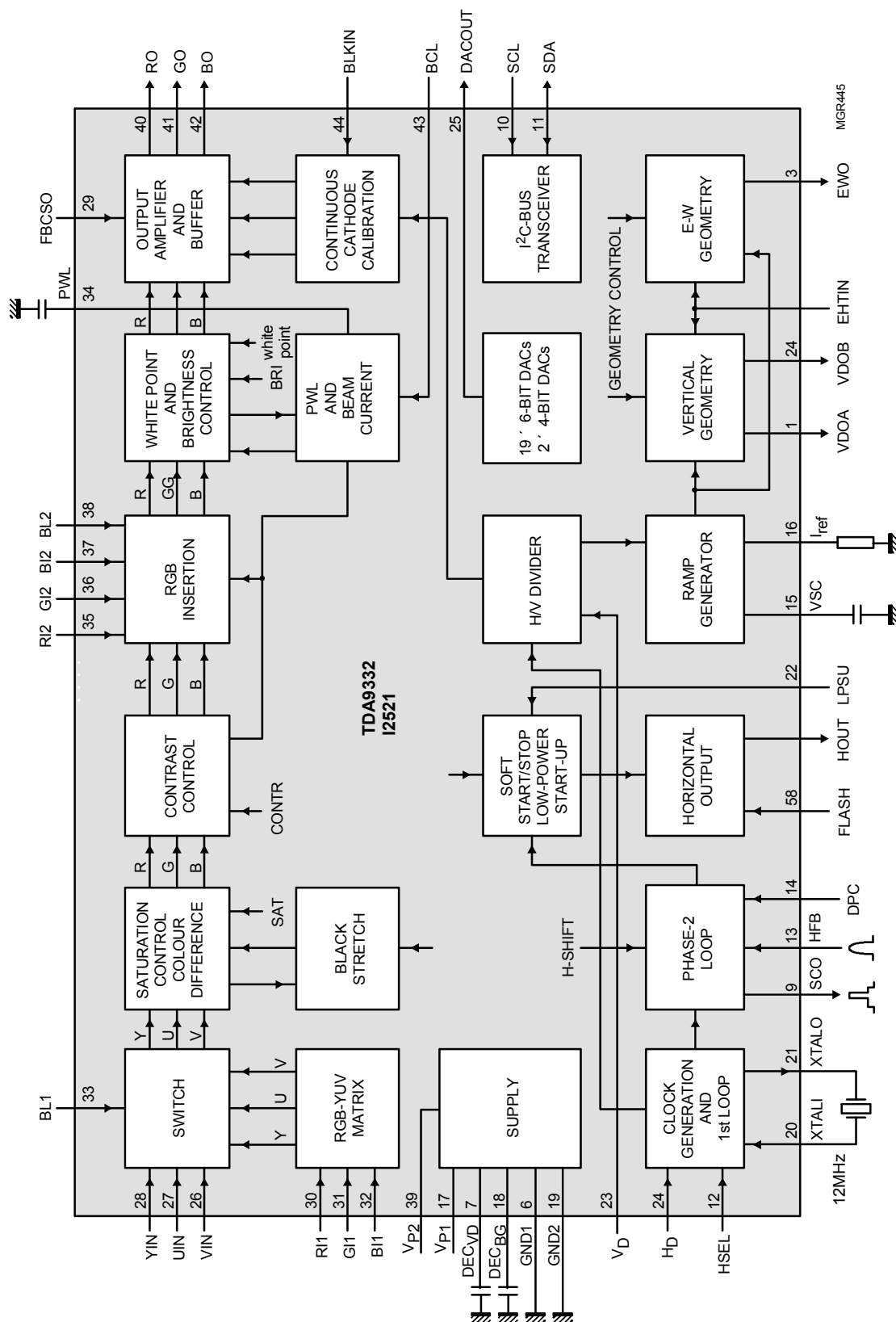
- RGB driver stages
- Beam current limiter circuit
- Automatic cut off control
- I²C bus interface and control register
- DAC for programmable d.c. voltage
- PLL for generation of cycle frequency
- Control block for the synchronisation of the output stages
- DAC for O/W, V control and H output stage
- Beam current dependent correction of the vertical and horizontal amplitude and beam current dependent H phase correction.
- Horizontal start up control

- I²C bus interface

4.7.1 Matrix circuits and signal selection

The R-Y, B-Y and the Y signals are fed to the IC via pins 26, 27 and 28. The green component is recovered and the RGB signals produced using two matrix circuits, one after the other.

These RGB signals are fed to a selection circuit, to which the RGB signals from the CCU via pins 2, 3 and 4 and from the VGA-interface via pins 35, 36 and 137 are also fed. With this circuit the required signal is selected or two signals mixed together.



According to the operating mode selection is either with H level on blank on pins 38 and 33 or controlled from the computer via the I²C bus.

In the following section of the circuit Y and colour difference signals are generated from the RGB signals.

4.7.2 Control stages

In the Y path the first component is a circuit for gamma correction and in the colour difference branch the colour saturation setting stage.

After RGB has been generated again from the difference signals and the Y signal, the setting stages for contrast and brightness are reached.

The control stages for contrast and colour saturation in the other IC's are set to maximum and have no function. There is, in addition, in each channel, a setting stage for the white value, and the black value is set with the amplifier stages that follow.

The white value and the basic setting of the black value are determined in the two corresponding positions of the service mode. In further a operation the black value is determined by the cut off control.

The RGB signals are output at a maximum of 3.5 V_{ss} via pins 40, 41 and 42.

The measured values for cut off and leakage current are fed to the IC on pin 44. With the evaluation circuits for leakage current and cut off, together with the computer, subsequent adjustment is carried out via the output amplifier, in order to keep the picture impression stable independently of aging.

Pin 43 is connected to the base of the diode split transformer. The circuit integrated into the IC thereby receives information about the beam current flowing into the c.r.t.

If the maximum permissible value is exceeded there, the circuit reduces the contrast and the brightness with the corresponding control stages. (see basic board "Beam current limitation").

4.7.3 I²C bus interface and raster correction

All control processes such as brightness, contrast, etc are controlled via pins 10 and 11 of the I²C bus interface. In addition, a DAC can also be controlled via the I²C bus. For this, TDA 9332 on pin 25 outputs an adjustable voltage. This is fed to the rotation panel on pin 3 of connector W 1021. At this point an additional coil on the tube turns the deflection raster, thus providing compensation of the earth's magnetic field at the installation site of the device. The value of the raster correction can set in both service mode and in the menu for picture functions.

If the device is turned, the influence of the earth's magnetic field changes. The planned rotatable rack takes this into account. The rack is controlled from the chassis, with the rotation angle being determined by the TV software. Raster correction can also be determined, in that on rotation the voltage on pin 26 of TDA 9332 is changed.

The influence of the rotation angle on the raster displacement is almost linear. On installation of the device, it is sufficient for correct functioning of the correction to input a value for raster correction into the EAROM for the centre and the two end stops.

4.8 Picture in picture

On the signal board an optional picture in picture circuit is possible. This circuit consists of the video processor

VPC 3233 / I 2151 and the PIP memory I 2161/71. The video processor PIP is the same IC type as the main video processor I 2271. With the VPC 3233 various PIP representations are possible. Our device controls support 3 PIP representations.

Split Screen

The screen is split into two halves. On the left side the half picture is displayed and on the right side the picture of the PIP electronics. Both pictures are the same size and quality. In the horizontal level, sections of a picture on the left and right are naturally cut off. The core area, however, is correctly displayed.

PIP small

The picture in picture, which is reduced to 1/9 of its normal size, can be positioned in any of the four corners.

PIP large

The same is true as for PIP small, only the size is 1/4 of the normal picture.

For 4:3 devices Split Screen is not possible.

For small and large PIP display the PIP picture must be correspondingly compressed.

This occurs at the vertical level by the interpolation of picture lines. For the small setting, 3 lines are compressed and for large setting 2 lines, and for each a new line is calculated by interpolation. In the horizontal level these lines are then compressed accordingly. The writing of the picture in picture data to the PIP memory is controlled completely by the PIP-VPC. Reading from memory is controlled fully from the main VPC.

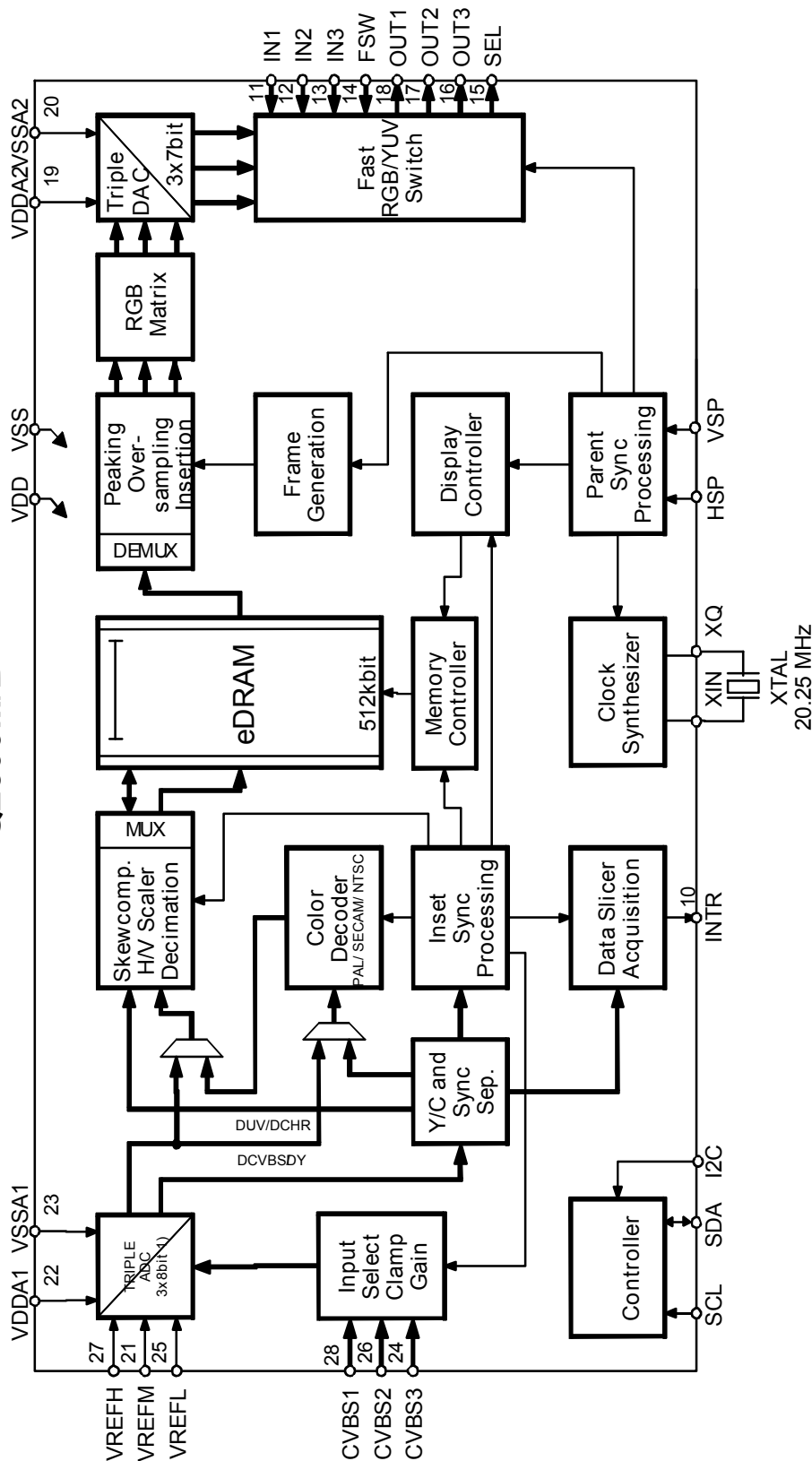
Writing to and reading from memory is therefore independent. There is no synchronisation between the two VPC's.

The PIP processor processes FBAS as well as Y/C signals. The video transfer applies the FBAS/Y signal to pin 73 and the associated chroma signal to pin 72. All possible signal sources can therefore be displayed as PIP.

If an online module is integrated into the TV set, the picture can also be displayed by the online module as PIP. The Y/C signal from the online module reaches the pin connector W 1531 on the signal board. The TVO/Y signal is applied to pin 74, and the associated chroma signal to pin 71 of I 2151.

For the basic and medium signal board variants a single chip PIP processor SDA 9488 is used.

SDA 9488x / PiP-Prozessor
Q2500M/B



With this module the PIP function can be used with our devices. Split screen and Multi PIP are not used.

This processor does not form part of the digital signal processing. As you can see from the circuit diagram, the RGB signals from SDA 9488 pins 15/16 and 17 are fed directly to TDA 9332 (pins 30/31/32).

SDA 9488 receives the FBAS or Y/C signal to be processed on pins 26/28 from the video-conversion IC.

The necessary 100 Hz V/H synchronous signals are fed to pins 4 and 3.

For our medium devices as for our high variant a VGA interface can be retro-fitted. The VGA RGB signals are not, however, fed directly into the TDA 9332, as in the high-end device, but for VGA operation are looped through the SDA 9488 to the TDA 9332.

From the VGA interface the RGB signals are led to pins 11/12 and 13 of SDA 9488.

4.9 Video/deflection controller TDA9332 (deflection area)

The Philips TDA 9332 video/deflection controller can be used in standard TV's as well as in devices with double picture and line frequency.

The video/deflection controller is switched in the Q 2500 chassis in such a way that it can drive the H/V deflection with double the frequency.

4.9.1 Clock generation/Phase 2 loop

All the necessary cycle and synchronous signals necessary for internal signal processing are derived from this block.

The synchronous signals generated by SAA 4979 are fed to pin 24 (H synchronous signal) and to pin 23 (V synchronous signal) of the controller. The cycle frequency for the video/deflection processor is produced with an external 12 MHz quartz on pins 20 and 21. This cycle is synchronised by a PLL that operates with the horizontal synchronous pulse HA.

4.9.2 DAC for OW/V control and H output stage

The DACs for the two vertical $-VD_{\pm}$ control signals contain all vertical correction information. The $VD_{\pm}$ control signals are output to pins 1/2 and are fed via R 1032 and R 1033 to pins 2/3 of W 1511. In this way the V output stage on the basic board is controlled by d.c.

The vertical frequency E/W parabola also contains all correction information. The control signal is output by I 2521 on pin 3 and is fed via W 1511 pin 6 to the basic board. In this way the E/W output stage on the basic board is controlled.

The horizontal output is programmed in such a way that on pin 8 a rectangular signal with 13 μ s H and 19 μ s L level for control of the H-output stage on the basic board is output. The signal reaches Q 2556 and Q 2561 on pin 13 of pin connector W 1511 via two inverter stages and controls H output stage Q 534 on the basic board via H driver stage Q 526.

In the SAT standby, for SAT radio and for overwriting in standby, the c.r.t. must be switched off. For this the horizontal pulse is switched off via transistor Q 2951. The control of Q 2951 is implemented via pin 79 of the SDA 6000 microprocessor. The c.r.t. is switched off here with H level.

4.9.3 Beam current dependent correction the vertical/horizontal amplitude and the H phase

As we know the high voltage at the anode connection of the c.r.t diminishes at high beam currents, owing to the internal resistance of the high voltage generation. The lower high voltage means that the beam of electrons is not so strongly accelerated and can be deflected outwards again by the V/H magnetic deflection fields. The picture becomes larger.

If the beam current decreases (darker picture content) the picture becomes smaller again. Appropriate corrective measures are neces-

sary to prevent this video pumping or at least to reduce it. To do this beam current dependent correction information is applied to pins 4 and 14 of the deflection controller . The OW and V amplitude are influenced via pin 4 and the H phase via pin 14.

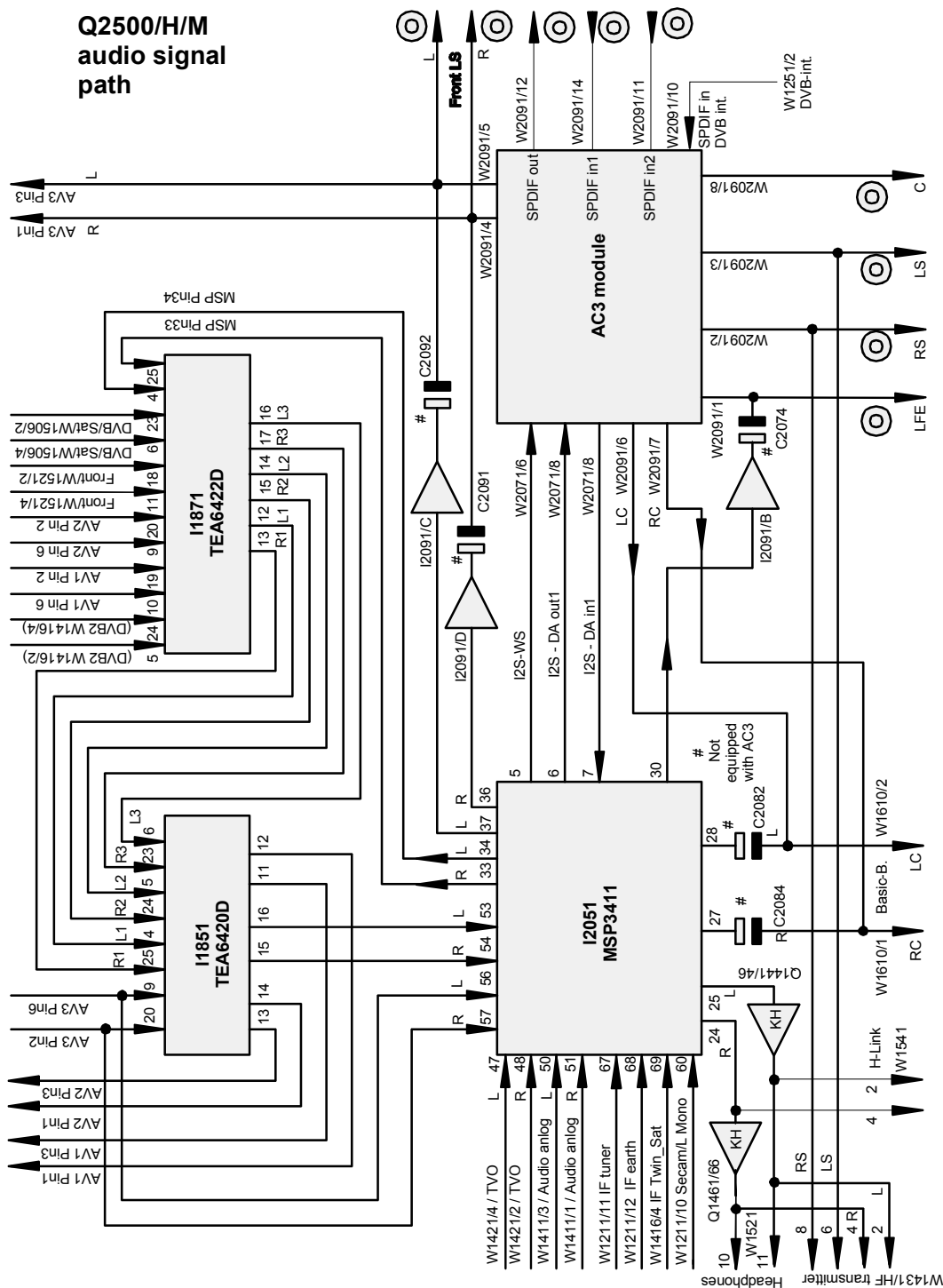
The beam current dependent information taken from the base of the diode split transformer and output by W 1511 via resistances and the two transistors Q 2639/Q 2638 is fed to pin 4 and pin 14 of TDA 9332. Switching via these two transistors ensures that the base voltage is adapted in an optimum way to I2521. pin 4/14 of I 2521 requires a voltage from 1.2 V to 2.8 V. The vertical amplitude compensation is defined firmly in I 2521 and is the same for all types of c.r.t. The horizontal amplitude compensation is influenced via internal registers by I 2521. Various values are held in EAROM for the various c.r.t types.

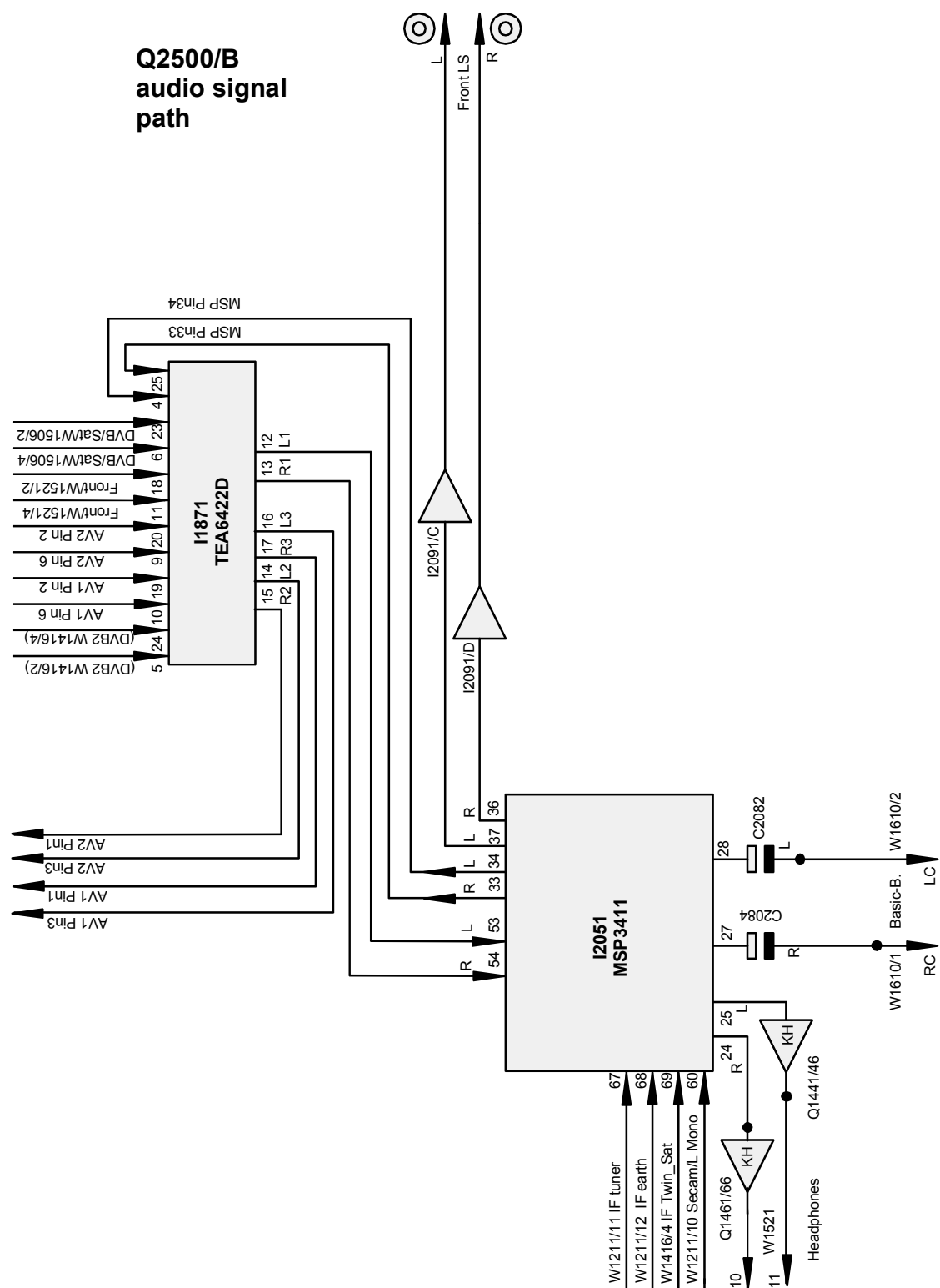
Dependent on the measured values the picture width and, if necessary, the V amplitude are influenced by the E/W output. Delay of the control is about the duration of 10 lines. A lateral glitch at bright picture settings cannot be avoided but can be reduced to some extent.

Due to the varying load on the line output stage, the line flyback pulse is also affected. This means that beam current changes also influence the H phase. The correction information on pin 14 of TDA 9332 opposes this via the internal phase correction.

5 Audio signal processing

5.1 Audio-Signal path
Block diagram Q 2500 H/M and B





In the Q 2500 chassis a family of multi-standard sound processors is used, which contain all the modules for digital sound/IF-processing, FM/Nicam signal demodulation, Nicam decoding and audio base band. The multi-standard MSP 3411 sound processor is manufactured in 1.0 μm CMOS technology and incorporated into the Q 2500 chassis in a 80 pin PLCC housing.

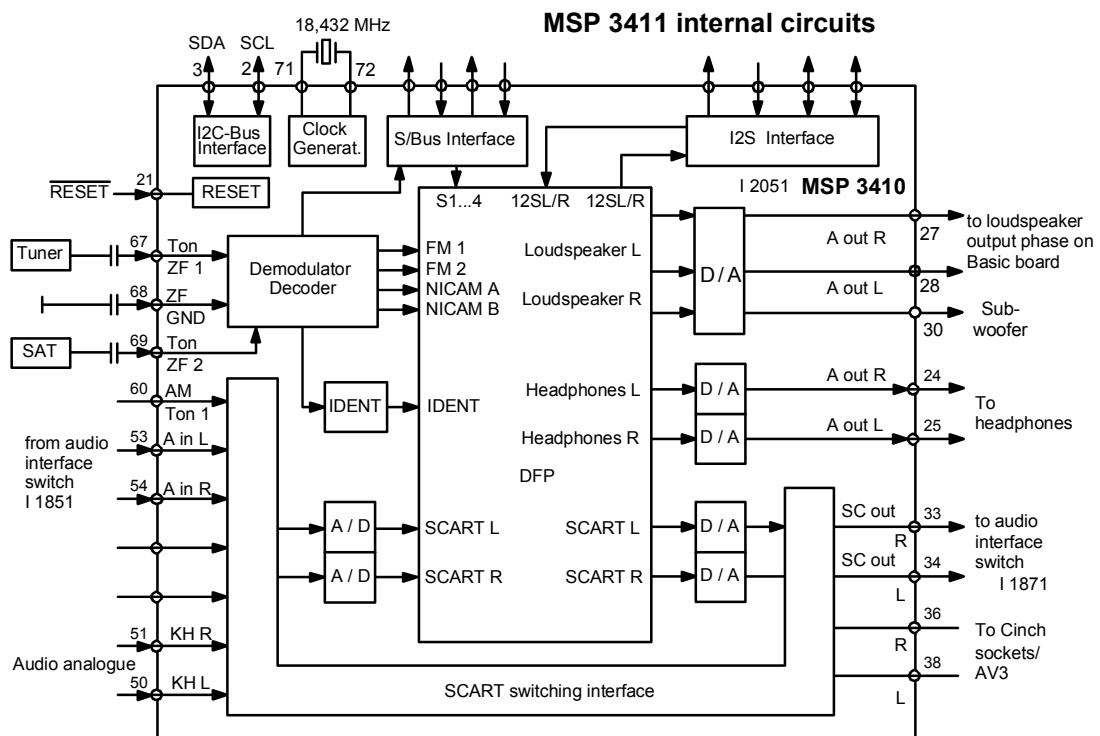
For devices without NICAM an MSP 3400 or 3401 is used, which cannot process these NICAM signals. The MSP 3401 and MSP 3411 also support virtual surround. Otherwise there is no difference between these three types.

The multi-standard sound processor can be roughly divided into a demodulator-decoder-block and into an area that is responsible for the digital audio base band processing - DFP.

The following functions are integrated into the two blocks.

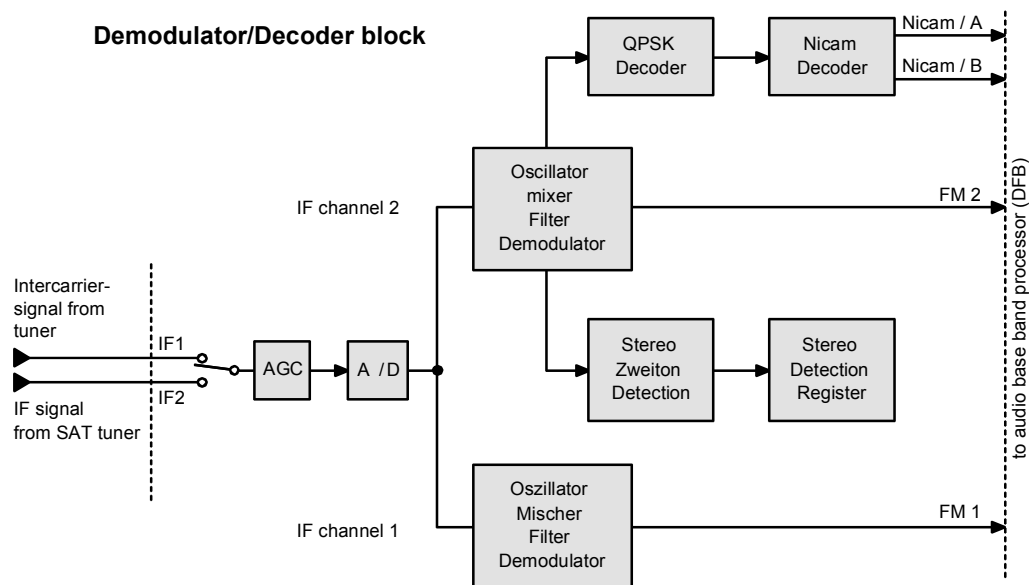
5.2 Demodulator/Decoder-Block

- Two selectable inputs for the sound/IF signal
- Automatic amplification control (AGC) for the selected sound/IF signal
- A/D converter for the sound/IF signal
- Two internal sound/IF channels, e.g. for stereo with sound carrier 5.5 MHz /5.74 MHz
- FM demodulation
- Decoder for Nicam signals



5.2.1 Audio baseband processing

- Flexible selection of the sound source to be processed, e.g. demodulator or Scart socket
- Selectable de-emphasis
- Stereo matrix
- Pre-amplifier for Nicam/FM and Scart signal
- Independent volume adjustment for loudspeaker and headphones
- Adjustment of bass, level, loudness, stereoscopic sound and balance in the loudspeaker branch and virtual surround



5.2.2 Demodulator/decoder block

The sound/IF inter-carrier signal output by the tuner passes via a band-pass consisting of L/C 2032, R/C 2033 and C 2036, to the sound/IF input1, pin 67 of MSP 3411. The band-pass suppresses frequency components below 4.5 MHz and above 10 MHz. In this way sound interference that could be caused by the colour carrier or the neighbouring picture carrier is prevented. If the Twin-SAT unit is used a SAT sound/IF reaches the sound/IF input2 on pin 69 of MSP via pin connector W 1416 /pin 4 and the band-pass, consisting of L/C 2037, R/C 2038 and C 2009.

The analogue sound/IF signal is passed internally from pin 67 (Hyperband tuner) or 69

(SAT unit) to a transfer switch that is able to switch between the two IF inputs of the MSP under software control. The analogue IF signal is then adapted optimally by an automatic amplifier control, which can control input signals from 0.14 to 3 V_{ss}, to the ADC. The ADC changes the sound/IF signal into an 8-bit data stream. The sampling rate is 18.432 MHz.

This is produced by the internal clock generator. The frequency determining 18.432 MHz quartz is connected to pins 71/72 of MSP 3411. This 18.432 MHz clock is also used for all digital processes in the MSP.

The digital sound/IF signal is now processed in a multi-standard sound processor by two independently operating sound/IF channels. This is necessary, for example, in order to process stereo transmissions with carrier fre-

quencies of 5.5 /5.74 MHz or even other sound transmission standards. These two IF channels can be programmed by the operating software to different sound carrier frequencies. For the digitally filtered sound/IF carrier full modulation is carried out in both channels. The digital sound signals are felt on the output of the demodulator/decoder block.

In the second sound/IF channel decoding of the pilot sound carrier takes place with sound transmission by the two carrier frequencies 5.5 /5.74 MHz. In addition to the FM modulated VF signal, the 5.74 MHz carrier is modulated with an AM modulated 54,7 kHz pilot sound carrier. The pilot sound carrier is variously modulated depending on the transmitted VF signals (mono, stereo or two-tone).

Modulation type from pilot sound carrier

Operating type	Natural frequency
Mono	unmodulated
Stereo	117.5 Hz
Two tone	274.1 Hz

Detection of the pilot sound carrier is carried out in the second IF channel, in which the 5.74 MHz sound carrier processing takes place. The result of the continuous pilot sound carrier evaluation is written to the "Stereo Detection Register" of the MSP. This register is read cyclically by the CCU via the I²C bus, and depending on the operating mode set the CCU communicates to the MSP via the I²C bus the type of de-matrixing that must be switched on.

5.2.3 Nicam processing

Nicam is a sound transmission system designed for terrestrial transmission. It was developed in the United Kingdom for stereo TV transmission and is now used in a number of other European countries.

The name "Nicam" is an abbreviation and stands for "Near instantaneously compounded audio multiplex".

In this system the digital audio information is modulated by an additional sound carrier.

The signal gets its name QPSK signal from "Quadrature phase shift keying" from the type of modulation, which is quadrature modulation with rotating phase,

Owing to the various television standards two different sound carrier frequencies are used for the Nicam transmission. For PAL-I the sound carrier is 6.552 MHz and for PAL-B/G it is 5.85 MHz.

5.2.4 Audio signals from the interface switching

If audio signals are fed to the Scart sockets, the selected VF signal pair is applied directly to pins 53/54 of the multi-standard sound processor via the audio interface switch (see Audio Signal Path). If the signal board is fitted with 3 AV sockets the audio signal is output by the AV3 socket directly to pins 56/57 of the MSP. The audio signal passes via an internal switch to two ADCs. The audio signal is digitised by the two ADCs for further processing and then led internally to the audio base band processor.

5.2.5 AM audio signals at L standard

If AM signals are processed in the device, the IF preparation and demodulation is carried out in the HF/IF block.

The VF signal comes from pin 23 of the cable tuner to pin 60 of the MSP 3411. Furthermore, the signal path is the same as the signals that come from the interface transfer to pins 53, 54 of the MSP.

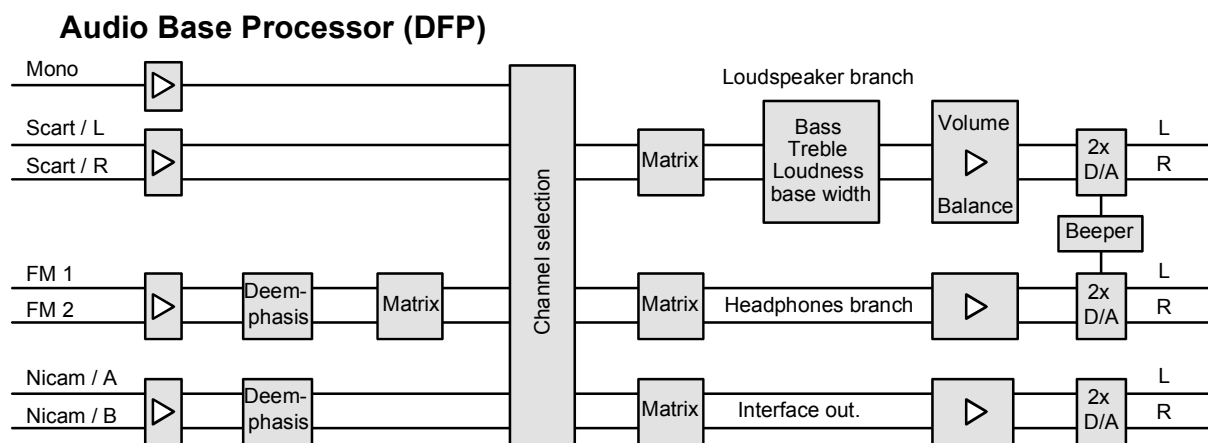
5.2.6 Audio base band processor

In the DFP there is a pre-amplifier for all three digital VF signal pairs; Nicam A/B, FM 1/2 and Scart L/R. The adjustment of the pre-amplifier for each VF input pair is independent and is determined by the software. This means that for further processing nearly the same digital VF level is available.

For the FM 1/2 and Nicam A/B signal pairs the pre-amplifier is followed by the necessary deemphasis. The FM 1/2 VF signal pair is fed onward to the FM matrix. For an FM stereo

transmission the stereo L and R signals are re-constituted from the L+R/2 signal of FM 1 and the R signal of FM 2 in the FM matrix.

The FM matrix is controlled by SDA 6000 via the I²C bus according to the selected operating mode - stereo or mono. In the following channel selection, after the selected operating mode, the selected VF signal is switched to the VF output branches in the MSP, which are controlled independently of one another, for loudspeaker, headphones and interface selection.



5.2.7 Loudspeaker branch

After channel selection the two VF channels are led to the digital filter and control stages, which are all controlled from the CCU via the I²C bus. As the processing for both channels is identical, the following description will deal with one channel only.

louder than deeper or higher frequencies. The filter coefficient necessary for the reduction is determined and is applied in varying strengths to the signal, depending on the volume.

5.2.8 Loudness

The signal comes from the matrix and is fed initially to a filter with which an 'as heard' loudspeaker control (Loudness) is implemented. Depending on the loudspeaker setting frequencies around 1 kHz are reduced, as for same sound pressure the human ear senses these frequencies as being a lot

5.2.9 Sound setting

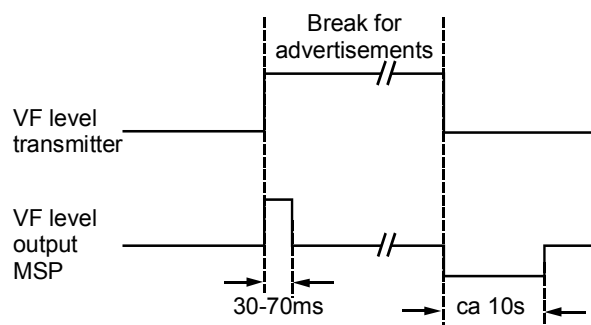
The sound control stage consists of two separate filters for the height and bass settings. The control range for the two filters is ± 12 dB.

5.2.10 Loudspeaker control and AVC (Automatic Volume Control)

The signal then passes through the loudspeaker control stage. The control range comprises 64 stages. In MSP 3411 each channel has a second control stage for the balance setting.

In addition, the MSP offers the facility of measuring the level at the input. This is used as the AVC function. This means that it is possible to select different volumes for transmitters during breaks for advertisements or between different transmitters. Therefore, the design does not provide for a programme location related volume correction.

The actual value on the input determined by the MSP is communicated to SDA 6000 via the I²C bus. In the operating software a precisely defined amplification is assigned via the volume value. If the measured value deviates from the required value, the volume is decreased or increased via the I²C bus until the required value is reached.



This means that various control constants are used. Loud passages are toned down within 30 to 70 ms. An increase in soft passages on the other hand occurs with a delay of about 10 s, to avoid an unwanted increase in volume during the transmission. In addition, the AVC can be switched off within the sound menu.

5.2.11 DAC

A DAC is controlled with the signal set by the digital controller. The analogue signal is output for the right and left channels on pin 27/28. The signal is then fed via transistors Q 2081 and Q 2083, which are switched as an impedance converter. Via the coupling capacitors C 2082/84 the signal then arrives at W 1610, pins 1 and 2, and from there is fed to the basic board on the two output stages.

5.2.12 Headphone branch

In the headphone branch there is an independent volume setting, that can be changed independently of the loudspeaker volume, also in 64 stages.

The digital/analogue converted audio signals for the headphones are output to pins 24/25. The W 1494 audio Cinch sockets are supplied with level by pins 36/37 of the MSP. In order to deliver sufficient output level to these Cinch sockets the Q 2500 chassis has in this branch two amplifier stages, consisting of the operational amplifier I 2091C and D. The amplifiers amplify the signal by a factor of 2. For the setting "Sound via HiFi unit" the output level can be set from 0 Vss to 3.5 Vss. If "Sound via TV" is set, then there is a standard level on the Cinch sockets.

5.2.13 Interface branch

The audio level for the interface is set by the operating software and cannot be changed. The digital, analogue-converted VF signals for the interface connection are applied to pins 33/34.

5.2.14 Deadline volume

During operation, a kind of awakening function can be programmed into the Q 2500 chassis as a deadline time. In addition, there is an awakening tone, with an adjustable volume.

Via the I²C bus it is also possible for MSP 3411 to switch off the sound in the loudspeaker and headphone branch. At the same time an internally generated 1 kHz rectangular signal is applied to these channels. In the headphone branch the level is dependent on the headphone volume. In the loudspeaker branch the level can be set, independently of other volume, in 39 stages in the "Time services" menu .

5.2.15 Mute circuit

As the only additional switching measure there is an active mute circuit parallel to the output amplifier inputs with transistors Q 1581 and Q 1586. It is controlled by transistors Q 2966 and Q 2961 from the ON/OFF command of the CCU, or via transistor Q 2027 from pin 77 of MSP 3410 .

Noise associated with switching on and off, as well as any crackling when switching over is suppressed.

Mute stages are also incorporated for the headphone branch and the Cinch sockets. If an AC3 module is incorporated it also generates a mute if necessary e.g. if the sound decoder is switched.

On start up the L level of the ON information of the CCU of transistor Q 2961 is blocked. The voltage taken from the conversion transformer and rectified by D 491 is able to charge Elko's C 2967/68 very quickly via diode D 381. The charge process from C 2963 flows via R 2963 extremely slowly, as D 2964 is now blocked. Not until Elko C 2963 is charged

to almost the same potential as C 2967/68 does transistor Q 2966 conduct. A positive voltage is felt on the base of transistors Q 1581/Q 1586 whereby this switches and the VF lines are at earth potential.

Not until C 2963 is charged and Q 2966, Q 1581 and Q 1586 are blocked, can the VF reach the output stage without hindrance.

At the point of switching off the voltage from the power supply falls off relatively quickly. Transistor Q 2961 is switched by the H level of the OFF information of the CCU . This means the charge from C 2963 can flow to earth. Q 2966 becomes conductive, whereby the charge from C 2967/68 controls transistors Q 1581 and Q 1586 and the VF lines are at earth potential.

The mute information that is active on start up and shut down activates all the mute levels.

In the initialisation phase pin 77 is set to L level by MSP 3411. With L level transistor Q 2027 switches. Via its emitter-collector path U5 also reaches the mute line and all mute stages are active.

To prevent the VF mute stages themselves producing interference during the switching phase, they are d.c. decoupled and fitted with discharge resistors.

If a Dolby Digital Module is incorporated the LFE channel from the mute function is controlled silently via transistors Q 1551 and Q 1552/56.

The Dolby Digital Module receives the mute function from the signal board on contact connector W 2091 /pin 13.



On the Dolby Digital Module the two surround channels are muted via transistors Q 8/Q 4/5 and Q 6/7. If a data error is detected on the Dolby Digital Module during digital sound signal processing, pin 30 on I 01 outputs H level. Via the two transistors Q 9 and Q 10 the mute function is then activated. For the mute function the Dolby Digital Module represents both input and output.

As you can see from the mute circuit, some sounds have an output line, as, for example, for the LFE channel Q1552/56, two transistors are used. This measure improves the mute behaviour and the error rate of these stages.

5.2.16 Headphone amplifier

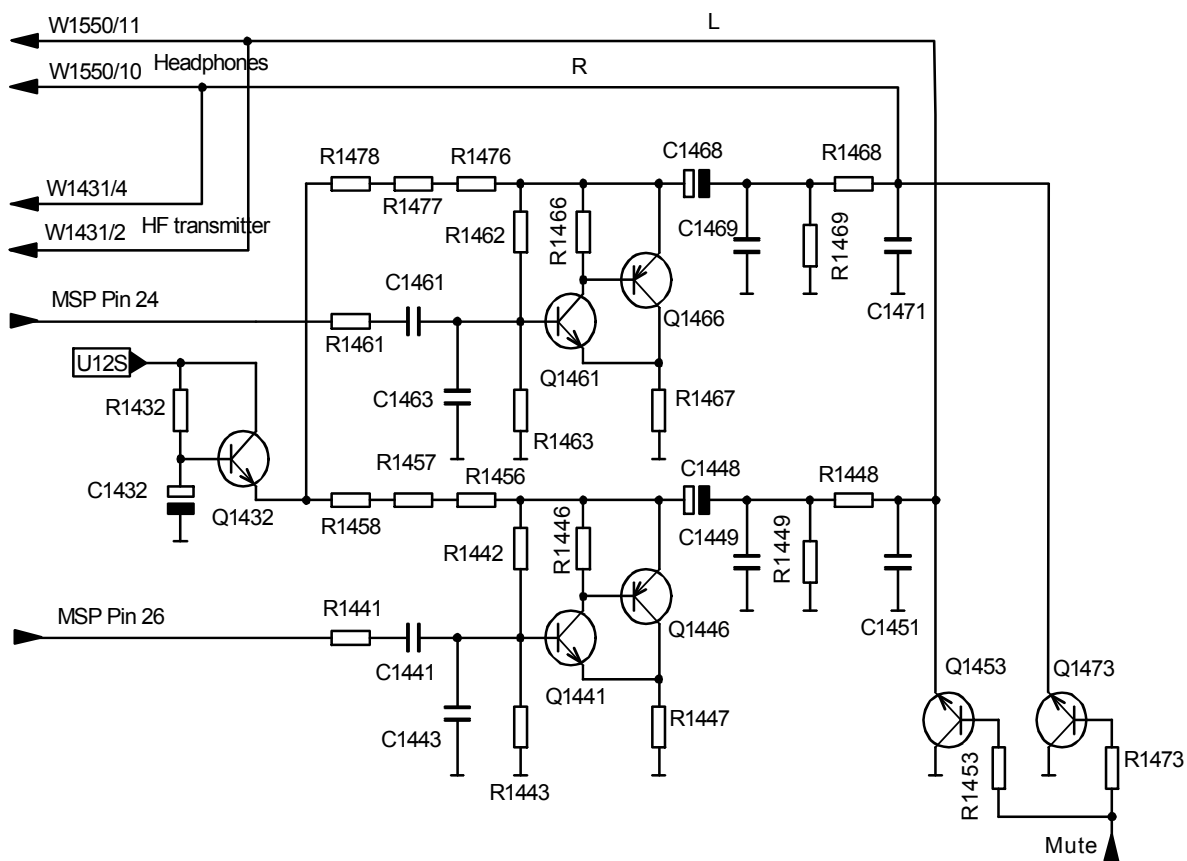
As in previous models the front panel of the device has a connector for headphones. As for the loudspeaker branch the signals are

also generated in the MSP 3411. As already described, the loudspeaker control for the headphone control is also implemented in it.

These signals are output in pulse width modulated form on pins 24 and 26 of the MSP and integrated with external RC components into an VF signal at up to 1.2 Vss. They are fed respectively to an amplifier stage, consisting of 2 transistors Q 1441/46 and Q 1461/66. This stage amplifies them to 9 Vss and outputs them via a decoupling through C 1448/68 to the headphones socket and pin 2/4 on pin connector W 1431 for the HF transmitter.

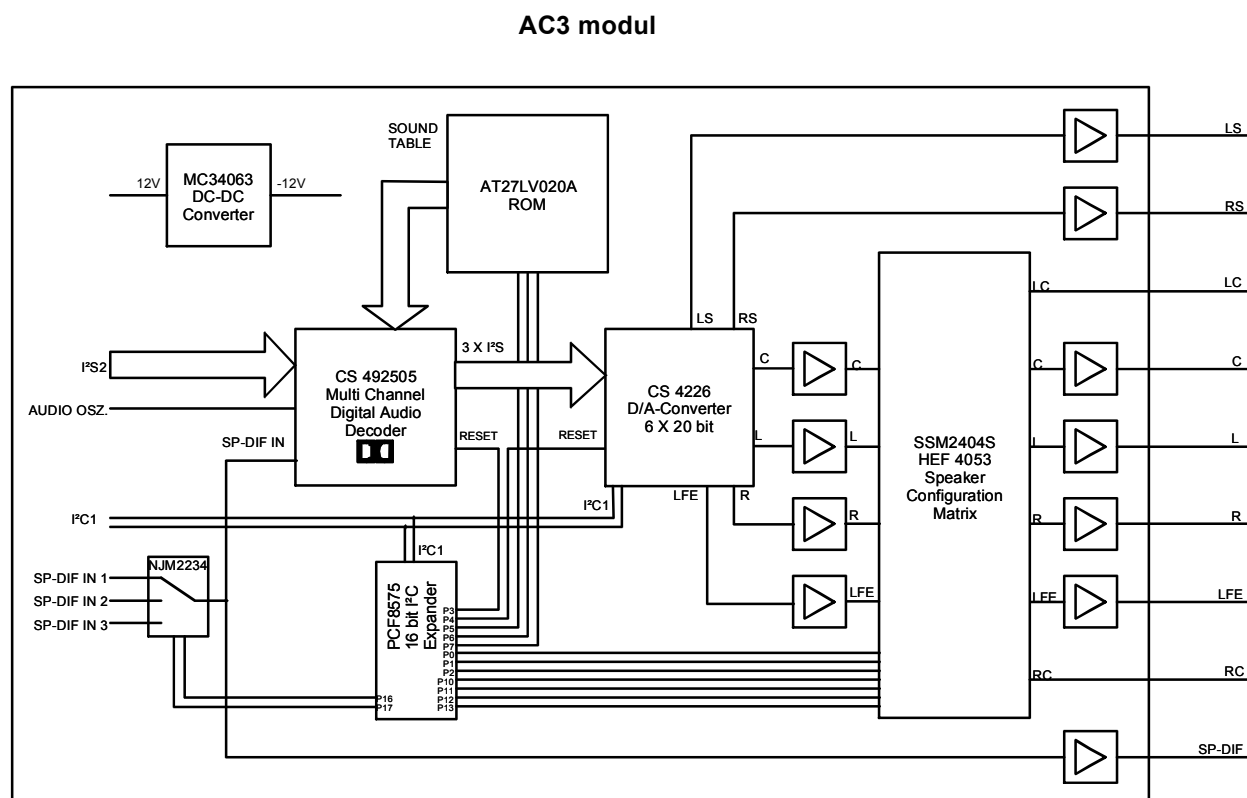
The headphones volume can be controlled in 63 stages and the setting displayed on the screen.

Headphones amplifier



5.3 AC3 module (Dolby Digital)

5.3.1 Block diagram, AC3 module



5.3.2 AC 3 signal processing

A Dolby Digital Module can also be incorporated into the signal board variants Q 2500/H and Q 2500/M. If a signal board is fitted with the AC 3 module, the essential sound signal processing takes place on the AC 3 module. The AC 3 module supports:

- Dolby Pro Logic
- Dolby Digital 5.1
- Circle Surround
- PCM Stereo

Dolby Digital 5.1 and Circle Surround can supply up to 6 sound channels.

- 2 channels for Front left and right
- 2 channels for Surround left and right
- 1 Centre channel
- 1 deep sound channel (LFE low frequency effects)

The Dolby Digital 5.1 Decoder is only active, when a correct AC 3 audio digital signal is supplied from a signal source.

The Circle Surround Decoder operates with a normal stereo signal. From this stereo signal the decoder decodes the 6 sound channels. This function has the advantage that for the great majority of stereo transmitters a 5.1 surround signal can already be used.

Dolby Pro Logic supports four sound channels.

2 channels for front left and right

1 centre channel

1 mono surround channel

Dolby Pro Logic also operates with a stereo signal, this must, however, also be coded with the Dolby Pro Logic standard. If this is not the case then no Center/Surround Signal is produced.

NF bandwidth of the sound channels

	Dolby Pro Logic	Dolby Digital 5.1	Circle Surround
2 channels Front L/R	20Hz-20KHz	20Hz-20KHz	20Hz-20KHz
2 channels Surround	no	20Hz-20KHz	20Hz-20KHz
Mono Surround	100-7kHz	no	no
Center	20Hz-7KHz	20Hz-20KHz	20Hz-20KHz
Deepsound-channel LFE	no	20Hz-100Hz	20Hz-100Hz

The AC 3 modules can receive digital audio signals via three paths.

- I²S bus data supplied from MSP 341x on the signal board.
- SPDIF audio data from the two digital Audio Cinch input sockets.
- SPDIF audio data from the internal DVBi 2 Decoder (deliverable end 2002, not used in all device variants).

The AC 3 module cannot process any analogue sound signals directly. The analogue

sound signals from internal – e.g. Sat unit, tuner or DB module – as also from external – e.g. video recorder – sound signal sources, must first be converted into digital sound bus data (I²S bus). This task is implemented by the Multi Sound Processor MSP 341x, which is incorporated into the signal board.

The digital I²S bus data is emitted by MSP I 2051 on pins 4/5 and 6 and are fed to the AC 3 module via pins 5/6/7 of contact connector W 2071. All analogue sound output signals to the AV sockets and the headphones amplifier are delivered by the MSP. The AC 3 module has no influence on these output signals. The AC 3 module does not deliver any I²S bus data back to the MSP. This also means that no sound signals are delivered to the AV sockets and the headphones amplifier, if signals are supplied only via the SPDIF Cinch sockets.

The SPDIF signals (SPDIF Sony Philips Digital InterFace, level 0.7 Vss-1 Vss to 75 Ohm) are supplied by the Cinch sockets to the contact strip W 2091 pin 14 SPDIF in1 and pin 11 SPDIF in2.

SPDIF data from DVBi 2 module is supplied to W 2091 pin 10.

The SPDIF signals reach the AC 3 module on changeover switch I 18. This is controlled by the I²C bus expander I 11 via pin 2/4. The SPDIF signal selected for processing is output to pin 7 of I 18. The selected signal is also returned to the SPDIF Cinch outputs via pin 12 of Q 11 and W 301.

I 2 converts the SPDIF signal – input pin 42 – of the I²S bus data – I 2 pins 1/43/44 – from MSP in the I²S bus data for the I 1 (DSP - Digital Sound Processor). I 1 processes this audio data according to the prescribed standard. For this the respective software required is loaded from I 5 memory. The memory is organised into 8 blocks, each of 32 kByte. For Circle Surround, Doby Pro Logic and Dolby Digital a 32 kByte block respectively is required. If, for example, Circle Surround is switched to Dolby Surround, the CCU controls Expander I 11 via the I²C bus in such a way that the address switching lines I 11 pin 9/10/11 of the memory block in I 5 for Dolby Surround can be selected. DSP I 1 receives an interrupt from CCU pin 77 via pin 14 of W 321.

The interrupt causes I 2 to load new software from the memory. Due to the block pre-selection from the the I2C bus expander, the DSP now loads the software for Dolby Pro Logic.

The DSP processes the I²S bus data according to the appropriate instructions. The overwhelming number of sound parameters to be set also occur in the DSP.

The DSP feeds the digital sound bus data back to the converter I 2, where the digital/analogue conversion takes place. The 6 sound output channels of I 2 reach W 301 via the operational amplifier and the loudspeaker matrix – consisting of I 6/9/14.

- pin 1 LFE/SUB (deep sound channel)
- pin 2 RS (Surround right)
- pin 3 LS (Surround left)
- pin 4 R (Front right)
- pin 5 L (Front left)
- pin 6 LC (Center left)
- pin 7 RC (Center right)
- pin 8 C (Center channel)

5.3.3 AC 3 IC functions

CS 4925-01 (I 1)

Multi Channel Digital Audio Decoder.

- Processes according to the operating mode, - Circle Surround, Dolby Pro Logic Dolby, Digital 5.1 - digital Sound-bus-data.
- Implements all sound settings, such as height and depth settings.

CS 4226 (I 2)

DAC

- Converts SPDIF signals into I²S bus data for I 1 .
- Converts the I²S bus data processed by I 1 into analogue signals for the loudspeaker matrix.

6 Interface switching

Interface switching is via Q 2500 on the signal board. Switching of the various on and off signals is implemented essentially by six ICs; two TEA 6415, two CD 4053 for the video signals, a TEA 6422 and a TEA 6420 for the audio signal switching. Control is directly from I²C bus system 3 via SDA 6000. An exception is CD 4053 I 1631 and I 1771.

I 1631 switches between the RGB lines of the AV3 socket and the RGB signals of the DVB decoder. I 1631 is controlled from a free switch output in MSP, which itself is activated by the CCU via the I2C bus. If the output on pin 78 of the MSP is switched to H level, then L level is felt on pins 9/10/11 of I 1631 via inverter Q 1637. With L level on, its control input I1631 switches to AV3 operation, at H level the RGB signals from the DVB decoder are switched through to the signal processing.

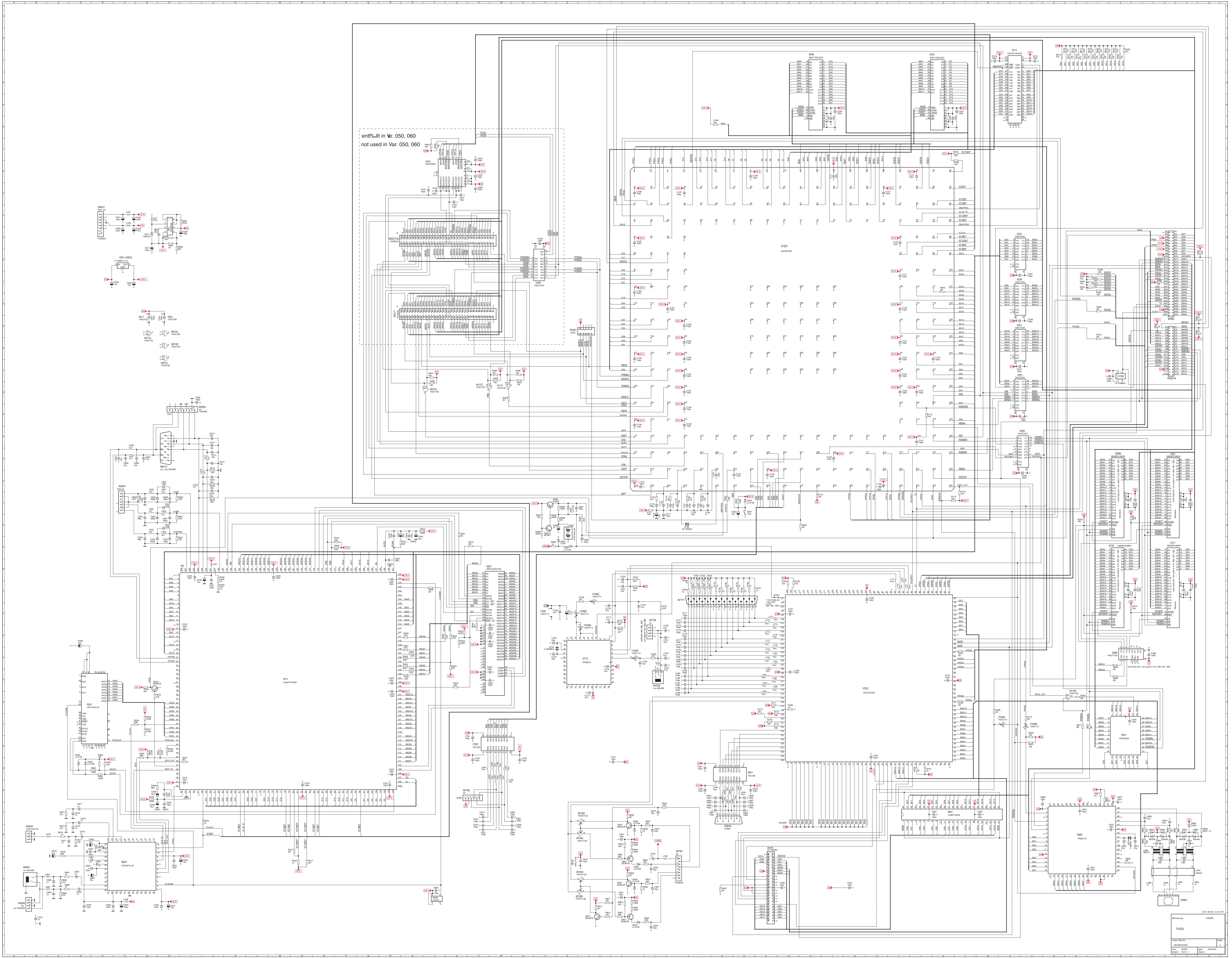
I 1771 is used for chroma signal switching if a Digital Link Plus SVHS video recorder is connected.

During SVHS operation a chroma signal is expected from SVHS Digital Link Plus video recorders on pin 7 of the AV socket. For VHS video recorders it is pin 15.

If the device control detects a SVHS Digital Link Plus VCR, the chroma signal is switched to pin 7 of the AV1 or AV2 socket on overlay and during a DVB recording. I 1771 is switched from two switch outputs on pin 115/116 I 2311. This in turn is controlled by the CCU.

As the two TEA 6415 must be addressed differently for picture signal switching, pin 7 of I 1116 is earthed and I 1181 is at the operating voltage.

The exact signal flow for the video and audio signals can be obtained from the appropriate flow diagrams.



entfällt in Var. 050, 060
not used in Var. 050, 060

